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Agriculture

NOVEMBER 15 1955

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NEW ZEALAND JOURNAL OF Agriculture

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Minister of Agriculture

This Month's Cover

Palmerston North besides being the centre of one of the North Island's principal farming areas has in or near it several well-known agricultural institutions. The city is also celebrated for the magnificent display of the flowering cherry trees along the Esplanade. Each spring hundreds of visitors come to see the profusion of blossom, an example of which is reproduced on this month's cover from a colour photograph by National Publicity Studios.

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REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE

Safety on the Farm

91 Accidental Deaths of Children on N.Z. Farms in 6 Years

By C. J. CROSBIE,
Machinery Instructor, Department of Agriculture, Christchurch

ALL New Zealanders will be shocked to learn that 91 children have been drowned or killed accidentally on farms in the 6 years since 1949, when the Department of Agriculture began a close study of farm safety. The gravity of the farm accident situation is increased by the fact that in the same period there were 100 tractor fatalities.

NEW ZEALAND'S high tractor fatality rate is an unenviable one; as far as is known it is the highest per head of population in the world.

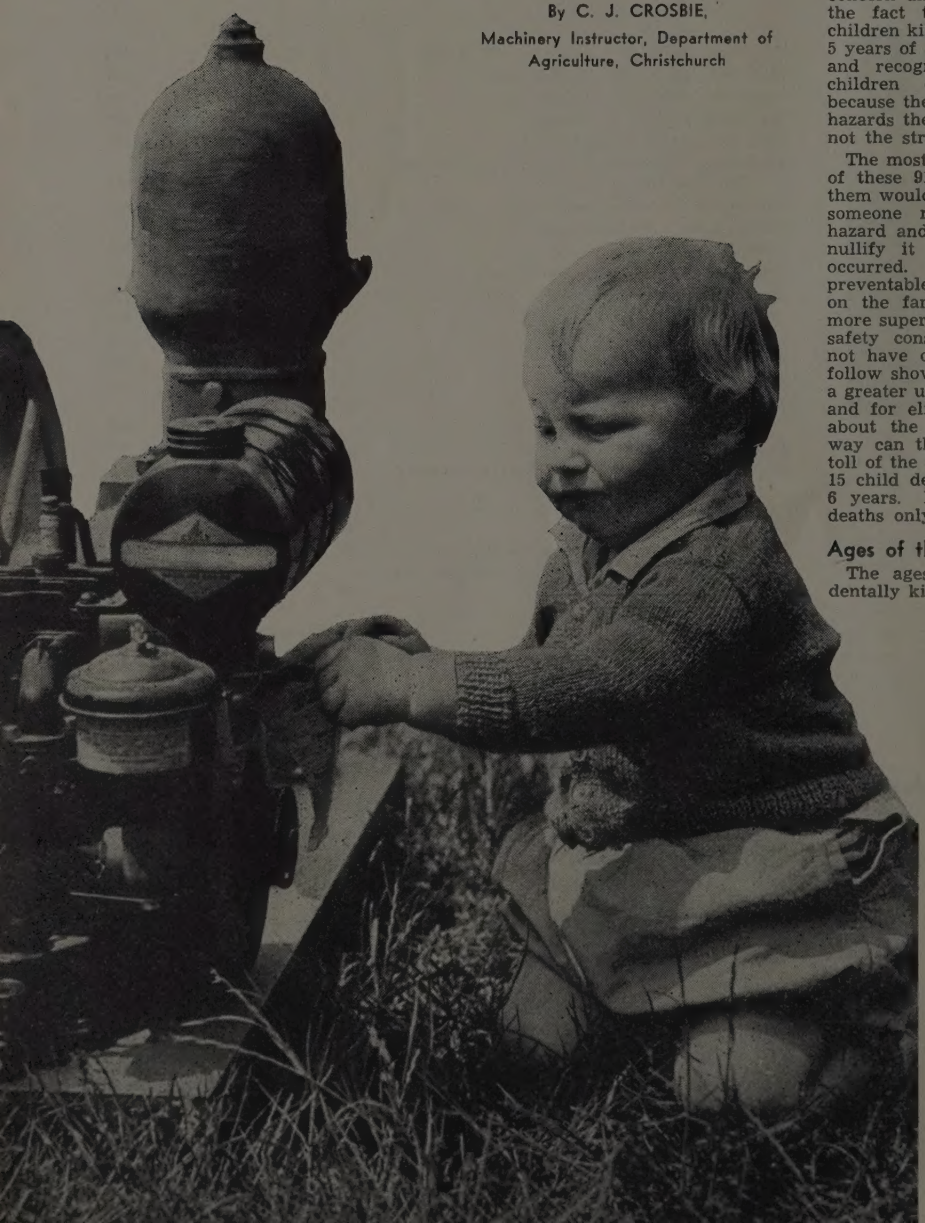
That the number of child deaths is so close to the number of deaths caused by tractors is of the gravest concern and even more distressing is the fact that 74 per cent. of the children killed or drowned were under 5 years of age. Knowing little of fear and recognising few dangers, these children died or were drowned because they encountered dangers and hazards they did not recognise or had not the strength to avoid.

The most tragic aspect of the deaths of these 91 children is that most of them would have been alive today had someone recognised the danger or hazard and taken steps to remove or nullify it before the fatal accident occurred. Many of the deaths were preventable. Had those in authority on the farms exercised just a little more supervision or been a little more safety conscious, the accidents need not have occurred. The facts which follow show the need immediately for a greater understanding of farm safety and for eliminating all hazards from about the homestead. Only in this way can there be a reduction in the toll of the annual average of just over 15 child deaths on farms for the last 6 years. Figures are for accidental deaths only.

Ages of the Children

The ages of the 91 children accidentally killed are:—

Age (years)	No.
1 to 2	25
2 to 3	26
3 to 4	11
4 to 5	5
5 to 6	3
6 to 7	1
7 to 8	3
8 to 9	2
9 to 10	3
10 and under 15	10
Not known ..	2
	91



Full of life, inquisitive, and recognising few dangers, this youngster is typical of many of the 91 children who lost their lives on New Zealand farms in the last 6 years. "Star-Sun" photo.

"The 19-months-old boy crawled away unnoticed", 21-months-old girl strayed from the house", "while playing in the yard the little girl aged 2½ years ran behind a truck", "the 14-months-old child was missing for only a few minutes" are disturbingly familiar words in newspaper reports of accidents to children too young to appreciate dangers about them.

After they reach school age children acquire a greater sense of what is right and what is wrong; they develop a respect for the common dangers and if they are involved in accidents, they have greater strength with which to extricate themselves. This is revealed in the steadily declining death-rate of children in the 5 to 15 years group.

No details were collected about children over 15 years of age, for they then become legally entitled (subject to test) to drive a car on public roads, a feat that requires a realisation of one's responsibility not only to oneself but to others and accordingly it may be said they have passed out of childhood.

[*National Publicity*

Nearly three-quarters of the fatal accidents to children on farms in the last 6 years have involved those under 5 years of age. Such children have little strength to extricate themselves if they get into trouble and should be protected against dangers round farms.

Facts and Their Implications

THE facts reviewed in this article were compiled from newspaper clippings collected by the Department of Agriculture between 1949 and 1954. Some Press reports may have been missed and some accidents may not have been reported, but the coverage is as complete as is practicable.

This report shows that at least 91 farm children died from accidental causes in a period when 100 tractor fatalities occurred. This must be of grave concern to parents.

Those in authority on farms must take the responsibility for making conditions safer for children. Nearly three-quarters of the 91 cases described concerned children of under 5 years of age. These children are too young to appreciate dangers and so to avoid them. They need protection. Dangers can be eliminated merely by observing simple, commonsense safety rules that are known to the average adult but are too seldom practised.

Inspect your farm and make it safe for children.

How Children Died

1. Drownings

By far the most common cause of accidental child deaths on New Zealand farms is drowning; 46 per cent. of the child deaths under review were drownings through various causes. Of the 42 children involved, 15 were drowned in streams, creeks, waterraces, and drains; 11 were drowned in dams, ponds, or wells; 10 were drowned in reservoirs, tanks, and troughs; 4 were drowned in sheep dips; and 2 in coppers (one in a farm yard and one in the home).

Almost invariably the children drowned in streams, creeks, etc., have been under 4 years of age. One child was only 12 months old and could not walk. One girl of 10 was drowned when on her pony she tried to cross a stream in flood while going round the sheep. The children drowned in stock water troughs were in the main under 2 years of age. They wandered away from the home or had been left playing in the yard. When their absence was noticed searches revealed that they had been drowned in troughs or low tanks.

A child who had been riding his tricycle in the backyard of his home was missing shortly after; his body was found in a hole in a paddock which had been filled by recent rains. On two occasions a child has been drowned in a pond while playing near it with brothers or sisters and the fact has not been discovered until the other children returned without him. Children have been drowned in wells, reservoirs, and tanks some of which had their covers temporarily displaced at the time of the accidents. In the 6 years under review 4 children have been drowned in sheep dips (and in the first 6 months of 1955 two more children lost their lives by the same cause). One child was drowned in a dip while work was in progress in a nearby shearing shed and another was drowned in a dip while dipping was in progress, though he had been put in a pen.

"Parents cannot be too careful with young children. Places which appear safe, and are safe 9 times out of 10, become unsafe when a child starts playing around them," observed a coroner at the inquest into the death of a 17-month-old boy who wandered

Most farm houses are adequately fenced against stock and the fences may be regarded as child-proof. Many children, however, wander away from homesteads unnoticed and become involved in accidents that may be fatal. Front and back gates should be inspected and made child-proof if necessary.

Accidents to Children and Causes

	No. of deaths
1949	10
1950	13
1951	19
1952	21
1953	13
1954	15
Total	91

YEARS AND CAUSES

Cause	1949	1950	1951	1952	1953	1954	Total
Drowned	5	6	9	6	6	10	42
Horses	1	3	—	3	2	—	9
Trucks	1	—	2	1	—	4	8
Tractors	—	—	—	6	1	1	8
Implements	—	3	—	2	1	—	6
Firearms	—	1	1	2	1	—	5
Fires	1	—	3	—	—	—	4
Milking shed machinery	1	—	1	1	1	—	4
Other causes	1	—	3	—	1	—	5
	10	13	19	21	13	15	91

CAUSES AND AGES

Age groups years	Drowned	Horses	Trucks	Tractors	Implements	Firearms	Fires	Milking shed machinery	Other causes
1–2	18	2	2	1	—	—	2	—	—
2–3	14	3	3	1	1	—	—	2	2
3–4	5	1	1	2	—	—	—	—	2
4–5	2	—	—	—	1	1	1	—	—
5–6	1	—	—	1	—	1	—	—	—
6–7	—	—	—	—	—	—	1	—	—
7–8	—	—	2	—	—	—	—	1	—
8–9	—	1	—	—	—	—	—	—	1
9–10	—	1	—	1	1	—	—	—	—
10–15	2	1	—	3	2	3	—	—	—
Not known	—	—	—	—	1	—	—	1	—
	42	9	8	8	6	5	4	4	5
Total	91								

from the garden into the farm yard. When looking into an old copper filled with rain-water he overbalanced and was drowned.

Missed by her parents for only a few minutes, a 20-month-old girl was found head down in a copper containing 9in. of water at her home. Artificial respiration was carried out but without effect.

The Remedy

With one exception child drownings have occurred at some distance from the farm home. Some children who accompanied their fathers to work on the farm have wandered away and been drowned, but by far the greater number drowned have wandered away from the farm home unnoticed.

It is impossible to fence all the drains, streams, creeks, water-races, dams, and ponds on a farm so that they are child-proof. If these drownings are to be prevented in future, the younger children must be confined to the homestead garden.

Most New Zealand farm homes are adequately fenced against stock and as such these fences are child-proof. The fences in general consist of a panel of heavy-mesh wire netting secured at top and bottom to either a wooden rail or tight plain wire, and preferably the fence should be topped with barbed wire. Fences round some homes fall below this minimum standard and a few are woefully deficient or non-existent. Farm homes in which there are young children

must be adequately fenced to the minimum standard suggested.

Front and back gates to the homestead often could bear a careful investigation. Generally they will not keep children in. Some drag on the ground and accordingly will not shut; others have some self-closing device, but do not latch shut; others are latched, but the latch is accessible to children; others can easily be climbed by active young children. A type of gate that it is felt would be child-proof at least until children become old enough to recognise dangers and take steps to avoid them is as follows:—

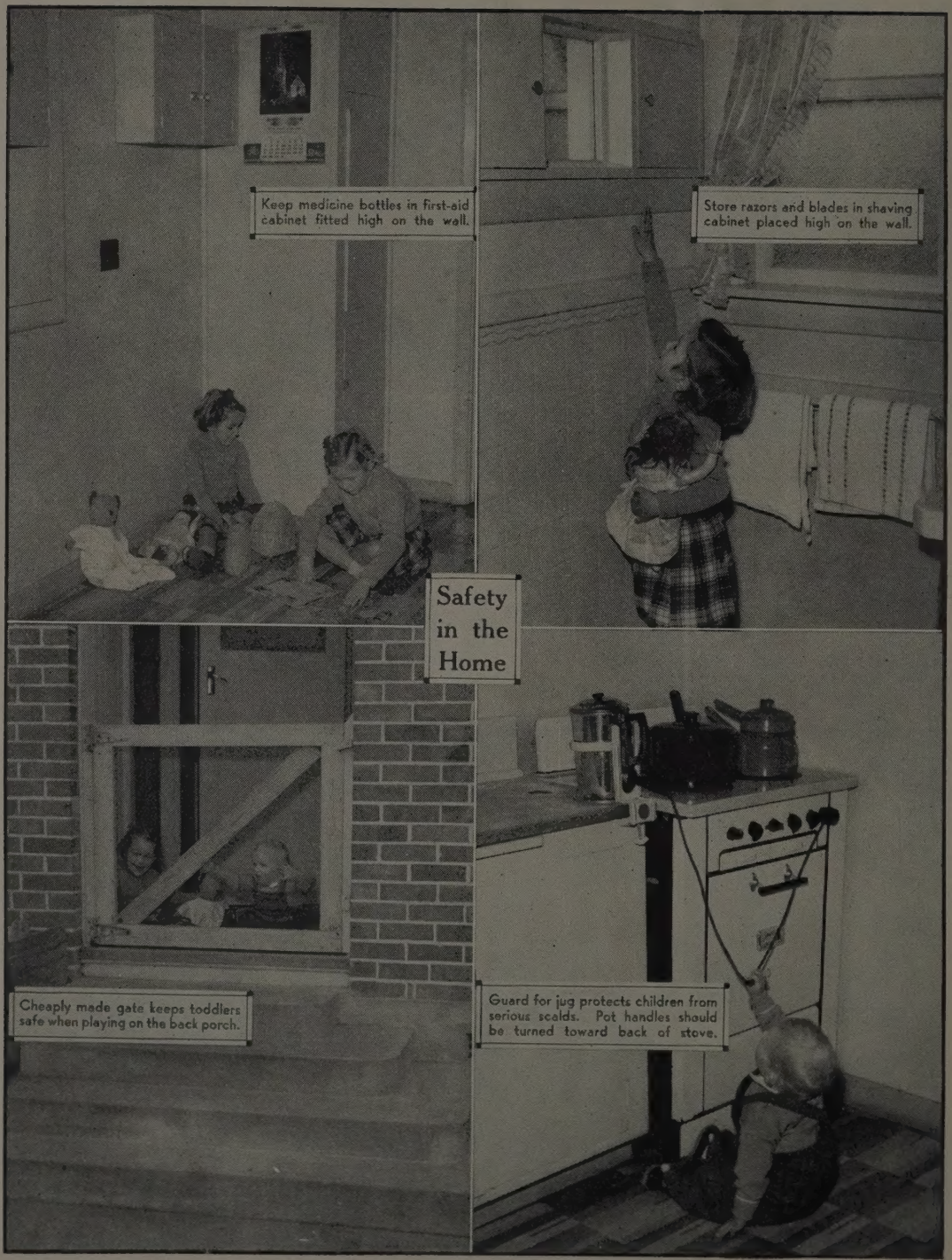
The gate should be of sound construction, of adequate height, and securely hinged to a sound strainer post. The gate frame should be covered with close vertical boards on the homestead side to prevent children climbing it or putting their hands through it. The latch should be on the outside of the gate and low enough to prevent its being opened by children leaning over the gate. The fence on the latch side of the gateway should be close boarded (or solid) to prevent children opening the latch by passing their hands through the fence. The latch should be strong and preferably of the self-closing type so that the gate automatically locks when it is shut. A medium weight coil return spring to close the gate automatically will also assist.

Alternatively tanks, wells, and reservoirs that contain water can be made safe. Tanks and reservoirs usually have their tops covered when manufactured and a manhole is left for entry for cleaning. Several cases are recorded where the manhole covers were not in place or were missing at the time of fatal accidents. Because a simple safeguard was not provided children's lives were lost. The building of wooden covers, treated with timber preservative to give long life, over wells and underground reservoirs is comparatively simple too.

A farmer who has studied the subject contends that troughs can be made safer for children if they are filled up with stones or boulders to within, say, 6in. of the top. If a child falls into a trough so treated, he is able to get out. Sufficient depth of

▲ One of the 8 dips (of the thousands in Canterbury) known to be fitted with a cover to prevent children from falling into it. About £5 worth of timber and half a day's labour are all that are required to remove the hazard of an uncovered dip.

▼ This newly erected 20,000-gallon underground reservoir is completely roofed over and the manhole which provides entry for cleaning is kept locked. A cover is being built for the settling tank to the right of the manhole. This reservoir has been designed to prevent children being drowned.


Keep medicine bottles in first-aid cabinet fitted high on the wall.
Store razors and blades in shaving cabinet placed high on the wall.
Safety in the Home
Cheaply made gate keeps toddlers safe when playing on the back porch.
Guard for jug protects children from serious scalds. Pot handles should be turned toward back of stove.

[*Standish and Preece*

[*National Publicity*

The committees which control boys' and girls' agricultural clubs' stock parades rightly insist that a prize school pony should be quiet, able to be handled by the youngest school child, and capable of being ridden by more than one child at once. The case histories of the 9 children killed by horses in the last 6 years indicate lack of supervision of the younger children and lack of horsemanship among the older children involved.

water is left to enable stock to drink. Provided the farm water supply system is fitted with an adequate reservoir (or a pressure tank) and the mains are large enough to supply water at the rate at which stock drink it, such a safety provision would not impair the water supply system. Even if this precaution is not adopted all over the farm, it is worth while for troughs near the homestead. An alternative safety measure is that of fitting wire netting over troughs (see page 488 of the May issue of the "Journal"), which is done to prevent lambs from drowning in them.

Six children have been drowned in sheep dips in the last 6½ years because the dips were not covered. In a 4-year investigation on thousands of Canterbury farms which have pot and swim-through dips the author found only 8 fitted with covers for the express purpose of preventing children from falling into them.

These dips were protected mainly by simple wooden covers in sections which could be lifted by a man but would prove too heavy for children. One cover was a series of wooden frames each of which was covered with heavy wire netting. The simplest cover can be made by spreading several battens across the dip and unrolling and securely fixing a roll of sheep netting along its length. Permanent covers in sections, however, are preferable.

By little cost and effort 8 farmers in Canterbury have made their dips safe. Their example should be copied by all sheep farmers who have open dips and children on their properties.

The fact that only 3 children of school age have been drowned on farms tends to reflect the success of "Learn to Swim" campaigns carried out by Physical Welfare officers. Farm parents are strongly recommended to take advantage of this instruction service, and rural school committees who have not yet arranged for a learners' swimming pool to be erected at their schools are urged to take up this matter immediately. All farm children should have the chance to learn to swim. Subsidies of up to £450 are offered by the Education Department to assist in the construction of learners' pools.

2. Horses

Though this is a mechanical age, horses were the next most important cause of child deaths, being responsible for 10 per cent. of the total fatal accidents. The case histories given illustrate the need for close supervision of children when horses are nearby.

A 20-month-old girl who was with her father on the farm wandered away toward the house. Attracted by a noise the father turned and saw a horse moving away and the child lying on the ground. She did not appear to be hurt, but died on the way to hospital.

Apparently kicked by a mare before being picked up in the animal's teeth and tossed in the air a 3½-year-old girl died on the way to hospital. She had been playing with other children in a paddock where horses were grazing. The horse had foaled only 7 days before.

Two 2-year-old boys died of injuries they received when they were kicked by horses one of which was regarded as quiet. A 13-year-old boy died in hospital from head injuries received in a similar manner.

A 14-year-old boy died in hospital of injuries he received when he fell from a horse and a 9-year-old boy died after he had been dragged by a horse. He was leading the horse on a long rope tied about his waist. It is

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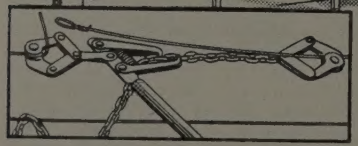
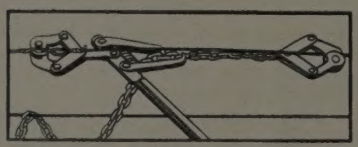


Grabs travel automatically up the chain, thus tightening the wire.



To make the knot, cut wire and form loop as shown in Fig. 1; slip other end through the loop, and finish knot over back left-hand grip as shown in Fig. 2. By knotting this way no slack wire is lost.

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[*National Publicity*

When children play unsupervised in a paddock in which tractors are working their movements are often quick and unpredictable. Tractor drivers have a full-time job and their attention should not be diverted from it by having to watch children. If children are to be allowed in a field where tractors and other machines are working, they should be under the control of an adult other than those operating machines.

thought that when he went to open a gate the horse bolted.

The Remedy

Two-thirds of the 9 children killed by horses in the years 1949 to 1954 were under 4 years of age. Here again lack of adequate supervision or the opportunity for the child to wander unnoticed from the home has been the basic cause of fatalities. Child-proof fences and gates round farm houses would reduce the number of accidents with horses. Lack of understanding of how to handle horses apparently contributed to two of three deaths of older children.

Suitable Ponies

At a boys' and girls' agricultural club stock parade held at a Canterbury primary school last year the writer was interested to see a quiet school pony of just average appearance obtain first prize over a mettlesome show-ring pony which could just be controlled by its girl rider. The committees responsible for these stock parades offer prizes for the pony most suitable for school use, for the best-groomed pony, the best girl rider, and the best boy rider, all in an endeavour to encourage quiet ponies for school children and a greater appreciation of horsemanship on the part of the children.

The judges at these stock parades rightly demand that a prize school pony should be quiet, able to be handled by the youngest school child, and capable of being ridden by at least two children at one time. Only when the scores on these points are equal are show-ring points taken into account.

At the conclusion of judging at the parade mentioned the judge explained to the children the reasons for his choice and then demonstrated the basic requirements of good horsemanship. The officials of pony clubs, too, give instruction in this field and are to be commended for their efforts. Good horsemanship is just as important for those who handle horses today as when horses were the common means of transport.

3. Tractors

Farm tractors were responsible for 8 child deaths in the period 1949-1954, details of which were given in the "Journal" (January 1954), and have been the subject of a special warning from the Minister of Agriculture Mr. Holyoake (March 1953 "Journal"). Briefly the cases were:—

A 22-month-old boy was killed when he crawled under a tractor that was under repair. The jack gave way and he was crushed.

A 2-year-old boy left on a stationary tractor fell off and a wheel passed over him when the tractor moved backward.

A 3-year-old boy sitting on a tin on the footplate of a tractor died instantly when the tin slipped off and he fell under a very heavy roller which the tractor was pulling.

One of four girls riding on a tractor, a 5-year-old, fell off and died of injuries when a direct-attached mower passed over her.

A 9-year-old boy fell from a tractor and into the path of a hay baler, a wheel of which passed over his body.

A 13-year-old boy died of injuries he received when his coat became entangled in an unprotected power take-off shaft between a tractor and a mower on which he was riding.

A 13-year-old boy was found dead under the wheel of a tractor he had been driving. It is thought that he attempted to jump off it as the tractor approached the edge of a drain and that his long coat caught on the gear lever, which caused him to fall. The tractor stalled with one wheel on top of him owing to its colliding with a concrete pipe on the side of the drain.

A girl aged 3, one of 6 children riding on a tractor being driven by an 18-year-old girl and used to cart a tank of water on a trailer to a farm home, fell off the footplate of the tractor and was killed instantly when she was run over by the trailer.

Despite the publicity given to the fatal accidents involving children and the acknowledged risk of allowing children on tractors, young children are still often seen riding on tractors or in charge of them in the field. One coroner has described this practice as "almost criminal negligence".

Already in the first 8 months of 1955, 3 children have been killed by farm tractors, making a total of 11 killed in this manner in 3½ years.

Another child was recently sent to hospital with severe injuries received in an accident when he was riding on a tractor with his father.

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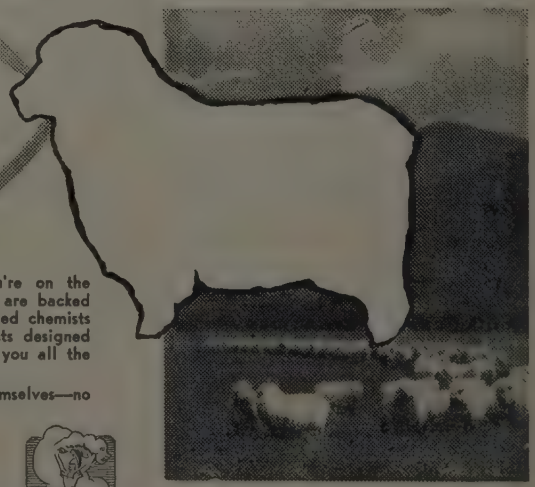

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The Remedy

The solution to this grave danger is to **keep children off tractors.**

In spite of this being a mechanical age, in spite of the fact that nearly all children play with toy tractors and it is only reasonable that they will ask for a ride on the real thing, no rides must be an inflexible rule in the field. To break it is to invite an accident that can easily result in the death of a child.

The writer knows of a farm where the rule is enforced rigidly. The children in their younger years asked for a ride on the tractor but were told "No. Not until you are older". They soon accepted the position and gave up asking. Later, when they are older, they will be taught how to drive a tractor and while they are being taught they will be under constant supervision until they are proficient. This farmer is to be highly commended for his action and his example should be followed by all in charge of farm tractors.

[*National Publicity*

To hear a farmer contending that his young boy can drive the tractor as well as he can is not uncommon. The assertion is probably true for straight, easy going, but a young boy has not the experience or strength to cope with an emergency. Children must not be allowed to drive tractors until 12 to 14 years old and must be taught and remain under full adult supervision until they are proficient in all phases of operation.

4. Trucks

Trucks on farms were responsible for 8 child deaths in the period under review.

When he was driving his truck slowly out from a farm house a driver ran over and killed his 17-month-old granddaughter, who ran out unnoticed from the house.

Fatal injuries were suffered by an 18-month-old girl when she was run over by a truck driven by her father.

A 2-year-old boy was killed when he crawled under a motor truck and the driver drove away unaware of the child's presence.

A 2-year-old girl accompanying her father in a truck from the farm residence to the cowshed fell out when the truck door flew open and was killed.

The father of a 2-year-old boy ran over and killed his son while moving his truck on his farm.

A 3-year-old boy was playing behind a truck at a milk stand and was run over.

A truck backing into a milk stand backed over a 7-year-old boy who fell off his bicycle in its path.

A 7-year-old girl fell from a truck and a wheel passed over her.

A fine example of action taken by a farmer to make conditions safer for children. The notice is seen by drivers of vehicles as they enter the farm yard on the road which passes very close to the house.

The Remedy

Use of trucks on farms is increasing each year. Many farmers own trucks, and cartage contractors' activities are expanding. The responsibility for children in the vicinity of a truck on a farm should rest with the parents or with the nearest adult farm worker. Of the 8 children killed by trucks six were under 4 years of age; they were too young to recognise the inherent dangers and must be protected against their own curiosity and lack of fear.

A truck driver once he enters the cab has a restricted vision of the ground immediately in front of the truck owing to the height of the bonnet. A child can get in close to the truck in the "shadow" of the lower part of the left-hand cab door and be unnoticed. There is a large blind spot on the left-hand side of the tray, particularly behind it and especially if there is a load on the tray. Truck drivers know this and take care before moving their trucks, but in spite of this children are still being killed. The responsibility for their safety must rest with the parents or other adult in authority.

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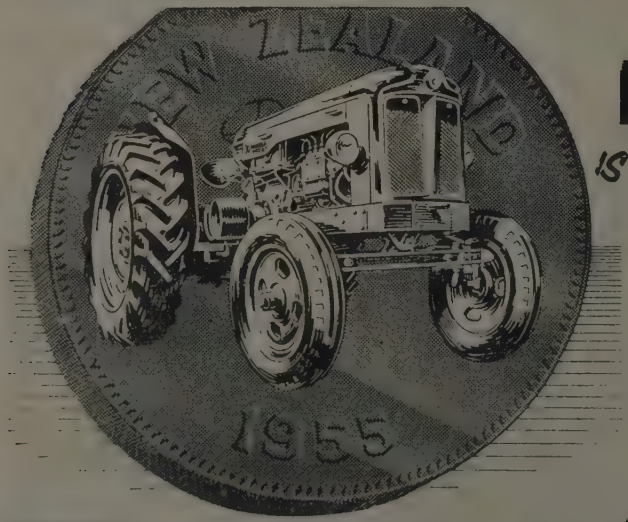

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5. Implements

Accidents with farm implements caused the death of 6 children.

A 2½-year-old boy died in hospital after he had cut one of his hands badly on an axe.

While her father was rolling grass seed in a field a 4-year-old girl who with two other children was playing nearby approached the roller unnoticed and the roller had passed over and killed her before the tractor could be stopped.

When a roller on which he was riding lurched over a depression in the ground a 9-year-old boy was thrown under the implement and killed instantly.

How dangerous it was for children to play in the vicinity of tractor-drawn farm implements was remarked on by the coroner at the inquest into the death of a 13-year-old boy—one of 4 boys riding on the framework of a roller—who fell in front of it and was killed. The boys had been instructed to get off, but they did not comply.

An 11-year-old boy died from loss of blood and shock as the result of being gashed below the knee by a set of tractor-drawn discs. The driver did not know that children were in the vicinity.

Though cautioned to sit down, a small boy riding in a tractor-drawn trailer rose, fell off it, and was killed when a wheel passed over him.

The Remedy

In the days of horse-drawn equipment implements had seats for operators, but tractor implements usually do not. For that reason it is extremely foolhardy to allow children to ride on tractor-drawn implements. The same strictures apply to horse-drawn machines with seats that have been converted for tractor use. Seats on such implements, because of the operating speed of modern tractors, provide no security for those riding on them.

Keep children off implements should be an inflexible rule.

Fatal accidents have occurred, too, when children were playing in a field in which tractor-drawn machines were operating. Tractor driving is a full-time job and children move quickly when playing and may run in front of a moving machine unnoticed by the operator and be injured or killed.

Children should not be in a field where tractors are working unless they are under the full supervision of an adult other than the tractor driver.

One fatality and several accidents have occurred to children riding on tractor-drawn trailers. Even seated children are not safe unless under the full supervision of an adult other than the driver, whose attentions are fully concentrated on control of his machine. He cannot supervise children as well.

6. Firearms

Inadequate care and supervision of firearms by adults have been responsible for the deaths of 5 farm children in the last 6 years. The circumstances in two of the cases were as follows:—

A 10-year-old girl and a playmate hurried home from school to finish building a playhouse on a farm. They were seen entering the sacking and wooden hut at about 3.15 p.m. At 3.40 p.m. the neighbours heard a shot and later discovered the girl's body. She had received the full charge of a 12-gauge shotgun in the chest.

A 10-year-old boy and a friend went to a farm to get milk and after collecting it entered a shed, where they found an old .22 rifle. They had been playing with it for only a few moments when it was fired, the bullet entering the boy's temple, killing him instantly. This rifle was old and rusty and had been lying in the shed for 17 years and had been treated as lumber. The bullet is believed to have been in the rifle since it had been left at the farm by a visitor.

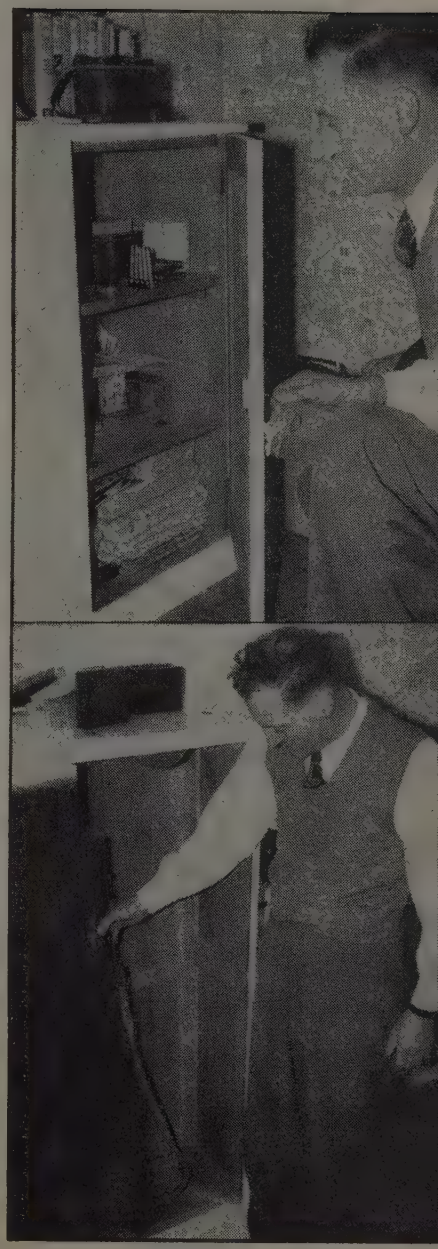
The Remedy

To leave firearms and ammunition, which everyone recognises as dangerous, within the reach of children shows extreme negligence. Yet this happens on farms and the result has been 5 deaths in the last 6 years.

Rifles and shotguns are often found in corners or on shelves of farm buildings with shells or cartridges nearby. Even in the farm home they are to be found behind a door in some room. In the duck-shooting season shotguns and cartridges are to be found on the back porches of many farm homes. The solution to preventing accidents with children and firearms is to break the association of the child, the firearm, and the ammunition. Any two of these are harmless without the third. A combination of all three can lead to fatal accidents.

All that is required is for the firearm or the ammunition—preferably both, but certainly the ammunition—to be locked away from children. If the ammunition is locked away—not merely placed in a high cupboard—the firearm may be kept high up on the wall on pegs in a position where it is available for regular care and attention.

Accidents with firearms occur in the main with children of school age. It is not sufficient to tell them not to touch firearms. They are still learning by copying and it is natural for them to want to do what they see adults do. Even though forbidden to touch firearms, children have been known to do so when authority was temporarily absent. They will be safe



[*MacDiarmid*

Five children have been wounded fatally with firearms in the last 6 years because sufficient care has not been taken with weapons, though everyone knows them to be dangerous. The essential precaution is to lock all ammunition away, and the same step is recommended for firearms also.

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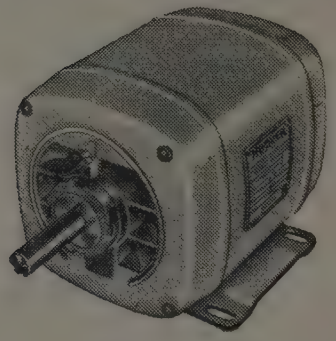

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1/6-½ H.P.	4 pole	(1425 r.p.m.)
1/6 & ¼ H.P.	6 pole	(950 r.p.m.)

THREE PHASE

50 cycles

400 VOLT

1/6-¾ H.P.	2 pole	(2850 r.p.m.)
1/6-½ H.P.	4 pole	(1425 r.p.m.)
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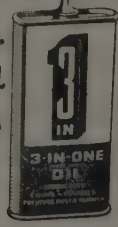

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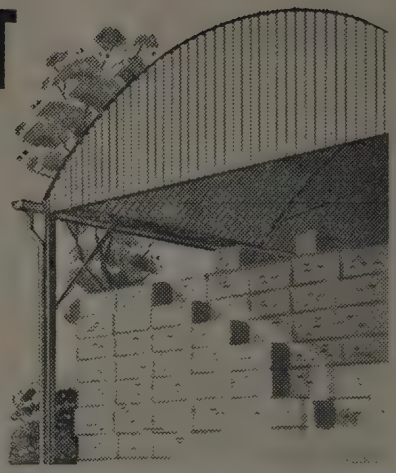

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only if the ammunition and/or the firearm are locked up.

7. Fires

Fires on farms have been the cause of the deaths of 4 children.

A 12-month-old baby boy was found dead in the ruins of a farm cottage which was destroyed by fire.

A 19-month-old child lost his life as a result of a fire when he was one of a group of children playing with petrol which was spilt on the ground and set alight by one child.

A 4-year-old boy with his 2-year-old sister went outside to play and later their mother saw the hayshed, about 50yds. away, on fire and heard the children crying from inside. She was able to rescue the girl, but the boy was at the back of the shed with flames between him and the door. The mother went for an axe to break down the back wall, but before this could be done, the building was enveloped in flames and there was no hope of rescue.

When her parents were absent from the house at milking time a 6-year-old girl's nightdress brushed against an electric radiator and caught fire, causing burns from which she died.

The Remedy

Fires generally hold a fascination for young children which few can resist. The dangers of children playing with fire are manifold and most parents, realising this, have forbidden children to play with matches. Yet because matches are an everyday household necessity, they are left within reach of children and this has led to fatal accidents. Obviously more care is needed.

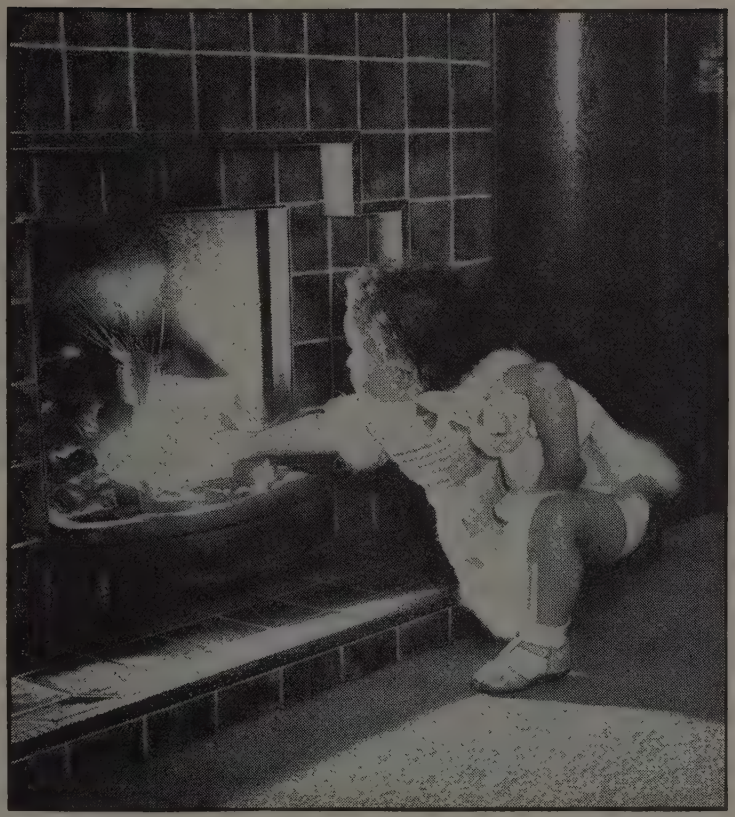
Unguarded electric radiators or those poorly guarded have long been recognised as a hazard, yet they are still causing fatal accidents. The danger is greatest when children are in garments made from an inflammable material. Wool does not burn freely and if woollen garments are carefully selected, they are not rough to children's skins, which is an excuse often made for not clothing children in woollen nightdresses or pyjamas.

There is now an electric radiator on the New Zealand market which gives off a "black" heat and when accidentally tipped over automatically switches itself off. The writer has seen a sliver of paper resting on the heating element of this radiator all day without catching fire.

The Wellington provincial conference of the Royal Society for the Protection of Women and Children (Plunket Society) has recommended that legislation should be passed making it illegal to sell electric heaters without adequate guards. Legislation prohibiting the sale of unguarded heaters has been passed in Sweden and Britain.

The case where both the child's parents were absent in the milking shed at the time of an accident is not an isolated one. In another case an 11-year-old girl suffered severe burns when she was alone in the house. Her mother and father were milking. She is thought to have spilt a bottle of methylated spirit over herself while standing near a lighted range. The fact that she promptly pulled off her burning clothing almost certainly saved her life, but she had extensive burns on both arms, across the shoulders, and down her back.

The risks to which children are exposed when they are left alone in the house for long while both parents are absent in the cowshed should be self-evident.



[*National Publicity*

Fires, matches, and electric radiators hold a fascination for young children and every care should be taken with them. Fires caused the deaths of 4 farm children in the last 6 years.

8. Milking Shed Machinery

Four fatalities have occurred as a result of accidents with milking shed machinery and one accident with shearing plant.

A 2-year-old boy died of injuries when he was caught in a shaft in a milking shed.

A boy who was told to put a rope in the cowshed fell against the separator and received a blow on the head from which he died.

A 2-year-old boy wandered into a cowshed and was caught in a pump shaft, receiving injuries from which he died.

Fatal injuries were received by a 7-year-old boy when he was caught in the shaft of a milking machine.

In addition the following accidents are recorded:—

A 3-year-old boy was admitted to hospital with a broken hip, facial injuries, and shock as the result of being caught in the shafting of a milking plant.

A 7-year-old boy received severe head injuries and a badly lacerated arm when his arm was caught in milking machine plant.

A 13-year-old boy had his right arm torn off when a piece of rope he had

attached to his hand became entangled with the driving shaft of a shearing machine.

The Remedy

Twenty-five years ago many milking plants in New Zealand were driven by petrol engines and had long and often unguarded belts and shafts. With rural electrification heavy, 3-phase electric motors replaced the petrol engines and though some belts were reduced in length, some were speeded up and little was done to reduce the dangers associated with them.

Later the system of having small, single-phase electric motors independently driving vacuum pumps and skimmed milk and water pumps and separators was adopted and long, flat belts were replaced with shorter V belts and the dangers reduced accordingly.

A move thoroughly recommended by officers of the Dairy Division of the Department of Agriculture is for servicemen installing new plants to place the pulleys and belts of moving machines against the wall so that there is less danger of clothing or limbs becoming entangled. However, there is still need to take special care in guarding bare, smooth revolving shafts, the dangers of which are fully realised by Factory Inspectors of the Department of Labour who have ample evidence of the ability of shafting to wind up loose clothing. Especially is this true of vacuum pumps, which have often been installed with a bare shaft on the operator's side.

The older types of petrol and diesel engines sometimes still in use in areas not reticulated with electricity have a dangerous type of cranking mechanism that requires guarding when the machine is working. The projections on the swiftly revolving shaft have caught clothing and caused deaths.

The advent of the separator with built-in electric motor and no exposed external drive is a safety move that will delight safety-conscious farmers.

There is still a need for greater safety in New Zealand cowsheds and farmers would be well advised to check their sheds and provide guards or make changes where necessary. Such action may save the life of one of their children

9. Other Causes

Accidents from causes other than those already listed have included the following:—

An 8-year-old girl died of injuries she received when she tripped and fell on a barbed wire gate.

A 2-year-old child died of burns received when a tin of caustic soda fell on him when he was playing in a cowshed.

A 2-year-old boy died in hospital soon after drinking a quantity of weedkiller.

A 3-year-old girl died when she drank arsenical foot-rot preparation stored in a cupboard.

A 3-year-old girl was electrocuted when she touched a wireless aerial which blew down in a storm and became charged with electricity.

These fatalities illustrate the diversity of accidents that can result in death on the farm. However, simple, well-proven safety rules still apply. There can be no adults in New Zealand ignorant of the dangers of children having access to poisons. Yet poisons are often stored in farm sheds in the most haphazard manner with little or no attempt to prevent children having access to them. Deadly poisons are being increasingly used on farms as pest poisons, weedicides, insecticides, and for treatment of animals. Such chemicals must always be stored in locked cupboards or sheds and empty containers should be burnt or buried deeply.

Children Learn by Copying

Children learn by copying; their first word and first conscious action are copied from a person attending them. They learn in this way until they reach the stage of reasoning for themselves and thereafter some of their learning is by deduction. While they are learning by copying they depend on those with whom they associate. If they are taught correctly and imitate safe habits and practices, they grow up knowing the right and safe way of doing things; they recognise the dangers and unsafe features round them and learn how to avoid dangers.

The more widely this is recognised the sooner will farms become safer for children. All parents have a moral obligation to teach their children safe practices and to support this by taking safety measures as they go about their work. To perform unsafe acts in front of children is to teach them unsafe practices. Later a child may repeat the unsafe act and be injured or killed.

Farm Life for Children

The country offers ideal conditions for children to grow up in. Fresh air, sunshine, good food, ample milk, plenty of exercise, and general open-air life constitute an excellent environment for children to develop into healthy, robust adults. It is a tragedy that all the advantages of a farm life can be negated by the actions of unthinking and in some cases negligent adults, but conditions on farms can be made safe for children. All that need be done is to observe well-known, proven safety rules.

Dangers about a farm are easily recognised, especially when circumstances are similar to those known to have caused serious injury or death of children. Equally true is it that most dangers are easily and cheaply removed, eliminated, or guarded against. The will and the incentive to act are all that are required.

There is an immediate need to MAKE FARMS SAFE FOR CHILDREN.

Meteorological Records for September

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	55.3	+ 1.5	71.2	37.8	7.77	18	+ 2.63	3.39	21	115.9
Auckland	160	55.7	+ 1.2	68.9	43.1	3.91	10	+ 0.12	1.39	21	132.7
Tauranga	10	53.9	+ 1.3	67.5	36.9	3.40	13	− 0.82	1.00	21	167.4
Ruakura	131	52.7	+ 1.8	69.4	31.4	3.56	12	− 0.12	1.08	7	132.5
Rotorua	975	51.6	+ 1.9	71.6	33.5	3.59	13	− 0.98	1.06	7	139.7
Gisborne	12	54.8	+ 2.7	77.8	36.1	5.18	12	+ 2.56	1.56	8	164.6
New Plymouth	160	52.4	+ 1.7	62.5	37.6	3.60	10	− 1.30	1.21	25	142.3
Karioi	2125	47.2	+ 2.2	73.5	30.0	3.28	15	− 0.99	0.91	26	
Napier	5	54.6	+ 2.6	80.0	35.8	4.19	10	+ 2.22	0.98	2	182.6
Wanganui	72	52.6	+ 0.5	69.1	36.3	1.54	8	− 1.00	0.40	25	123.0
Palmerston North	110	52.2	+ 1.7	66.6	33.8	1.34	13	− 1.67	0.31	25	107.8
Waingawa	340	51.0	+ 1.7	77.0	32.0	2.71	14	− 0.56	0.70	26	159.7
Wellington	415	50.8	+ 0.9	62.5	37.9	4.09	11	+ 0.25	1.25	2	165.6
Nelson airfield	5	49.5	+ 1.8	68.1	31.1	1.49	7	− 1.67	0.72	26	219.6
Blenheim	12	51.7	+ 1.5	74.3	29.9	1.28	5	− 1.00	0.68	25	217.5
Hokitika	15	49.0	+ 1.2	62.1	29.3	7.34	18	− 1.28	1.60	5	142.8
Hanmer	1270	48.4	+ 2.3	77.0	28.0	3.44	10	− 0.99	1.66	1	173.4
Christchurch	22	50.9	+ 2.2	76.5	31.3	0.90	6	− 1.16	0.33	21	178.8
Ashburton	323	50.6	+ 2.7	74.2	29.8	1.74	7	− 0.88	0.53	17	164.3
Timaru	58	49.5	+ 1.9	73.8	31.6	1.24	9	− 0.71	0.46	1	167.4
Alexandra	520	49.8	+ 2.7	71.8	24.2	0.67	6	− 0.15	0.41	5	167.1
Taieri	80	48.0	+ 0.3	72.4	27.2	1.58	12	− 0.35	0.39	1	136.2
Invercargill airfield	8	47.0	+ 1.3	69.7	27.8	3.39	17	+ 0.17	0.86	23	136.5

Water Hyacinth Must be Exterminated

ONE of the world's worst weeds of waterways is established in parts of the North Island. This article by S. H. Saxby, Agrostologist, Department of Agriculture, Wellington, draws attention to the harmful nature of the weed and discusses the steps being taken to destroy it.

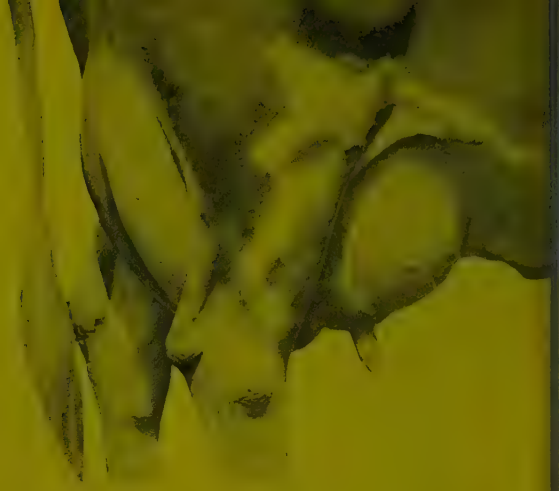
▲ An infestation of water hyacinth that is creeping out toward the centre of a lake which it will eventually cover completely.

▼ A deceptive veneer of beauty providing a dense bank-to-bank smother of vegetation which covers the water and prevents its free movement.

▲ Though water hyacinth is susceptible to hormone weedkillers, its dense canopy of leaves often provides some protection to those nearer the water. At least two sprayings, the second 2 to 3 weeks after the first, are therefore usually necessary. The illustration shows a few plants which were not killed by the first spraying.

Dead and dying rafts of water hyacinth in → the foreground. In the raupo at the back is a patch that was missed during spraying. If any live plants such as these are left, they will form the nucleus from which the weed will spread again over the whole area.

● Available only through your veterinarian



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New Zealand's Worst Water Weed

THE pretty mauve flowers, attractive glossy green leaves, and very rapid growth of water hyacinth provide a deceptive veneer of beauty to the worst water weed in New Zealand. Beneath this veneer grows a putrefactive mass of vegetation and tangled fibrous roots. Plants with leaves only a few inches high support a root system that goes down in the water 6ft. or more and allows only the water to filter through it. When growing in a stream, water hyacinth acts as an effective dam to the free movement of water.

PEOPLE who have seen only the flowers and leaves of water hyacinth or who have grown it in an aquarium find it hard to believe that the plant has cost some countries enormous sums of money in the clearing of navigable waterways, streams, lakes, and ponds.

Water hyacinth is established in a number of places in the North Island, and its presence in each has resulted from its having been introduced deliberately. These introductions have probably been made with the apparently worthy but misguided objective of beautifying a stretch of water. In the past water hyacinth was sold in shops and at bazaars, and plants were freely distributed among friends.

The sale, distribution, and growing of water hyacinth are now prohibited. This prohibition is part of a campaign to exterminate water hyacinth wherever it is growing in New Zealand and so prevent the damage it has caused in other countries. In America it has rendered rivers unnavigable to ships and in Australia it was a contributing factor to the disastrous floods earlier this year. Through its spread in New Zealand it has made some stock-watering dams useless, it has spoilt some lagoons for fishing, and it has blocked waterways. Its control has already cost a large sum of money, but unless water hyacinth is eliminated, heavy expenditure will be necessary for its control year after year as is the case with weeds like gorse, blackberry, and ragwort. Its elimination can result only from its complete clearance from lakes, streams, fish ponds, and aquaria. If a single plant is left, reinfestation is more than likely.

Some people consider that the water hyacinth growing in fish ponds and aquaria, where it is under control, need not be destroyed. The greatest danger is presented not by the confined plants themselves, but by the portions that have to be removed as the result of vigorous growth. These pieces are usually thrown away, given to a friend, or, worst of all, used to beautify a nearby stretch of water.

The struggle to control water hyacinth in many areas of New Zealand has been going on for 5 years or more. Some success, notably at Rotorua, has been achieved, but for various reasons its elimination has not been possible in several districts. The Department of Agriculture has now set up a small mobile weed-control team whose duty will be the elimination of certain weeds which are present in the country in comparatively small amounts but which are potentially dangerous. One of these weeds is water hyacinth.

Infestations Easily Started

The following examples show how easily infestations of water hyacinth start. On one farm there were three stock-watering dams. The owner secured several plants of water

The fibrous rooting system of water hyacinth, which is not apparent from the water surface, is the most harmful feature of the weed.

hyacinth and told an employee to place some in each of the three dams. The employee for reasons best known to himself fortunately put all the plants in one dam, where the water hyacinth grew so well that it filled up the dam and made it useless for providing water for animals. The dam has had to be drained.

In another instance it is reasonably certain that a person threw a plant of water hyacinth over the side of a bridge into a large drainage channel. The weed grew and spread up and down the channel and into backwaters and threatened to block the whole waterway. It has now been eliminated, but only at considerable cost.

In a different district three plants were placed in a lagoon which provided good fishing. After a few years most of the lagoon was covered with water hyacinth, the fishing had deteriorated, and the property owner had to cut and remove many tons of water hyacinth to allow a small boat to be taken into the clear water in the centre of the lagoon. This lagoon has now been partially cleared.

In yet another case a clear-running, sparkling mountain stream ran into a deep hole used as a swimming pool and then on into a swamp. Water hyacinth was introduced into the swimming hole to make it look pretty. Not only did the water hyacinth fill up the swimming hole, but it drifted downstream and established in the swamp. The swimming hole has been cleared, but the clearing of the swamp remains a problem and is a source for the infestation of other areas of water.

In contrast to these unhappy experiences are several acts of timely and inexpensive eradication. One person noticed a single plant in a small area of water and removed it. If it had been left there, it would have increased.

Another plant was noticed in a small glass aquarium in a shop. After having the danger of water hyacinth pointed out to him the owner willingly destroyed it. As there was a stream next to the shop, it was quite likely that when the water hyacinth had outgrown the aquarium it would have been tossed in the stream to beautify it.

In a third case a small clump of water hyacinth was noticed in a fish pond beside the main street in a town and was removed and destroyed. This action doubtlessly saved the fish pond from becoming useless and also exterminated another source of plants for fresh infestations.

SPREAD OF WATER HYACINTH

[*Naden Matthews*

A parent plant of water hyacinth from which another plant is being formed (right). At the bases of the leaves are sponge-like, air-filled cavities which provide the necessary buoyancy to support the plant's massive root system.

Weaknesses of Water Hyacinth

In the planning of the control of any weed it is necessary to aim at striking it at its weakest points. Water hyacinth has two important weaknesses: First, it will die when thrown on dry land, though it will survive if left in large damp heaps. It will also live among grasses on the fringes of lagoons, etc. Therefore when it is removed it must be placed where it is certain to die.

Second, it is very susceptible to hormone weedkillers. These have been used successfully both overseas and in New Zealand. Dense infestations and infestations growing among raupo and other water weeds require at least two sprayings, each of which must provide a complete coverage. If this is not done, the plants which have been missed will continue to grow and eventually will result in a complete reinfestation.

The greatest problem associated with the elimination of water hyacinth is that though most of its spread is vegetative, in a few areas it is setting seed. As the seed is capable of germinating and maintaining the infestations, the time taken to eliminate water hyacinth in these areas is likely to be prolonged.

The destruction of water hyacinth can be achieved only if all infested areas are known and destroyed. Any person knowing of any infestations, large or small, is requested to notify the nearest office of the Department of Agriculture.

Where water hyacinth is removed mechanically from waterways all plants must be left on dry ground to ensure that they die.

The Home Orchard in Summer

SPRAYING to combat pests and diseases and cultivation are the two most important summer jobs in the home orchard. This work, with some notes on passion fruit, dwarf apple trees, and espalier training, is discussed in this article by S. P. Money, Horticultural Instructor, Department of Agriculture, Wellington.

THERE is great pleasure in watching the home orchard crop develop to maturity, but without help against the many pests and diseases a crop may be spoilt or destroyed and the trees and vines seriously damaged. Even if some damage has been sustained, the fruit may be saved from complete loss by prompt spraying now. A complete spray programme for the home orchard published in the August issue of the "Journal" should be consulted for the selection of spraying materials.

At this time brown rot (*Sclerotinia fructicola*) begins to cause serious losses. This disease is particularly troublesome in stone fruits, but may attack apples as well, though it is not as common in this type of fruit. The over-wintering stage of the disease was discussed in the August issue of the "Journal". In summer spores are produced by this disease as soon as it attacks the fruit. The fruiting bodies which produce these spores are seen as powdery brown patches over the surface of the fruit as shown in the upper illustration on page 455. When this disease appears the fruit showing infection should be picked immediately and destroyed to prevent spread of the disease by the spores.

Passion Fruit

Passion fruit vines need attention during summer and one of the most important jobs is the application of manure during December. Each established vine should receive a mixture of 2lb. of blood and bone, ½lb. of sulphate of ammonia, ½lb. of sulphate of potash, and ½lb. of superphosphate additional to similar amounts supplied in spring. Quantities of fertiliser will vary with the quality of soil, more being needed on the poor or lighter types to maintain satisfactory vigour.

In drier districts the soil may have to be kept moist by thorough watering if wilting of the vines is to be avoided. Wilting through lack of water, besides causing loss of crop, can seriously weaken vines, making them more susceptible to attack by diseases and pests.

One of the most common diseases of passion fruit is brown spot (*Alternaria passiflorae*), which can cause up to 50 per cent. loss of crop. Brown spot is a disease affecting leaves, stems, and fruit. The first symptoms appear as small spots on the leaves. They are brown and circular at first, but later develop a lighter centre and become angular and as large as 1in. across.

On the stems the dark brown areas usually appear at a point of minor damage such as a rub or leaf scar. The infection spreading from this point encircles the stem, which suddenly wilts. On the fruit the spots appear as pinpricks, but soon enlarge and develop sunken areas which turn brown. The fruit rind shrivels and the fruit falls. The stem infection is the most serious form of this disease and infected wood should be removed and burnt.

The standard bordeaux spray of 3 : 4 : 50 strength (4oz. of copper sulphate and 5oz. of hydrated lime to 4 gallons of water) should be applied throughout the season at regular intervals.

Harvesting

The early harvesting of orchard crops begins in summer and the home orchardist can obtain the fullest benefit by picking the fruit when it matures rather than taking the whole crop from the tree at one picking. This type of spot harvesting has an effect similar to thinning. Allowing fruit which is not mature to remain on the tree enables it to develop in size and gain a higher proportion of the sugars manufactured by the leaves.

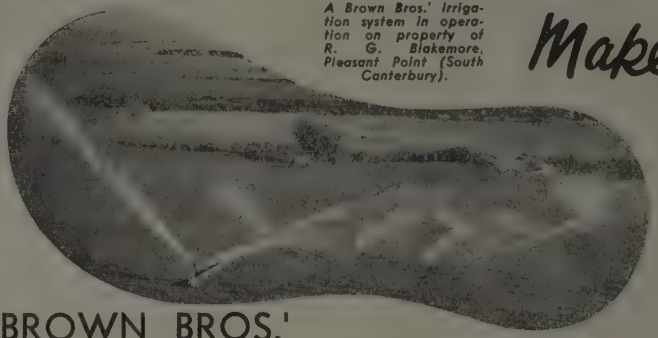
Determining when a crop is mature is not always easy, especially with apple varieties. Colour and size are important, but a handy reference, especially for green apples such as Granny Smith, is the colour of the pips. The apple is considered mature when the pips have attained half their brown colour. When the pips become dark brown or black the apples are usually ripe. Cox's Orange apples have loose pips and when the fruit is ripe the pips can often be heard rattling when an apple is shaken.

Apples ripen over a fairly long period. The fruit on the outside and top of the tree is usually the first to ripen and should be picked first. Long-keeping varieties intended for storing should be picked while they are still too hard to eat.

Pears are somewhat different from other fruit in that they attain best flavour and texture for eating if picked in a mature but firm condition and ripened at room temperature. As soon as sound pears begin to drop picking should begin. The seed-colour test is valid for pears also.

Stone fruit should be harvested when the flesh will break easily without being soft. Strawberries should be picked when they have attained full colour and gooseberries when they are a suitable size but still hard. Other small fruits such as raspberries, boysenberries, and black currants should be harvested when firm and ripe.

Care is essential when fruit is being picked or handled, as any bruising will greatly impair its keeping quality.



A Brown Bros.' irrigation system in operation on property of R. G. Blakemore, Pleasant Point (South Canterbury).

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Dwarf Apple Trees

The introduction into New Zealand of the East Malling IX apple rootstock has opened new opportunities for home orchardists to grow a greater variety of fruit in a limited area. All apple trees sold by nurserymen are composed of two parts, a rootstock and the fruiting variety grafted on to it. The rootstock of dwarf apple trees, the part that is placed in the ground, has been selected for its dwarfing qualities; that is to say, it reduces the size of the tree without depressing the amount of fruit the wood will carry.

Commercial nurseries have been importing and propagating East Malling stocks only since the end of the Second World War. Apples are the most successful dwarf trees to date. Some degrees of dwarfing in pears can be accomplished by grafting the variety wood to quince stock and there have been some dwarfing tendencies in stone fruit stock, but none of these is perfected yet and for the purpose of this discussion apple trees only will be dealt with.

[*Shell Photographic Unit, London*

Brown rot on a peach. Fruit affected with this disease should be destroyed.

Planting

Dwarf apple trees received from a nursery arrive in much the same condition as normal fruit trees. They should be planted with the graft well above the surface of the ground so that the variety scion will not take root. When the soil has been placed round the roots it should be firmed by heeling as is done with any tree. Dwarf apple trees should be staked obliquely against the prevailing wind. This is because the dwarf trees have brittle rootstocks which are liable to break if not supported.

[*Department of Scientific and Industrial Research*

A 3-year-old dwarf apple tree in crop with rod approximately 3ft. high.

Site

Dwarf trees, because they do not cast much shadow, are not as difficult to site as are standard trees and can be grown in any part of the garden, as flowers and vegetables will grow quite well close to them. Because of their height dwarf trees are not difficult to shelter. Protection from strong winds and adequate sunlight are still needed, however, as for other fruit trees.

Planting Distances

Trees on East Malling IX stock should be planted 8ft. apart and 4ft. from any boundary. The trees can be grown in rows with at least 3ft. between the trees and 6ft. between the rows. In this latter method a somewhat different shaping of the tree is adopted.

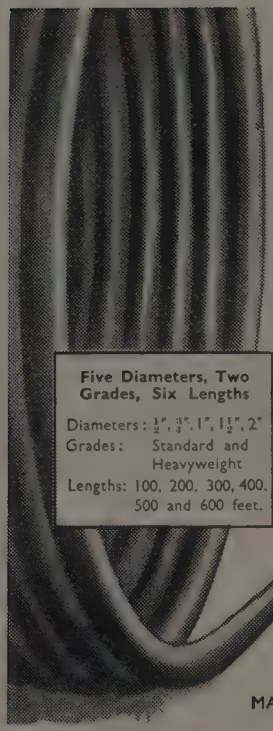
Pruning

Dwarf apple trees are most easily trained when pruned to the system normally used for standard trees. This is the normal vase shape in which all the pruning is carried out during winter. Many home gardeners are interested in espalier and cordon types of tree training and in these techniques summer pruning is most important.

Summer pruning: Summer pruning consists of reducing the length of shoots at a time of the year when trees are in full leaf. When a large number of shoots are shortened many leaves are lost and this reduces the quantity of carbohydrate compounds supplied by the leaves to the plant. Therefore the capacity of the tree to produce roots and shoots is retarded. Summer pruning not only reduces vigour in the way described, but it also helps to initiate and maintain fruit bud development.

[*Department of Scientific and Industrial Research*

A 3-year-old dwarf apple tree in full bloom with rod approximately 3ft. high.



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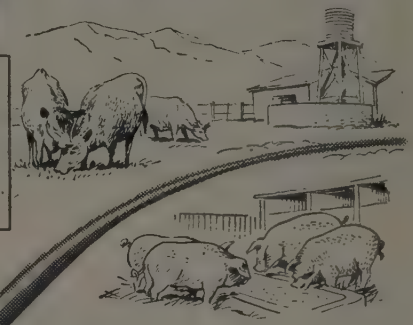

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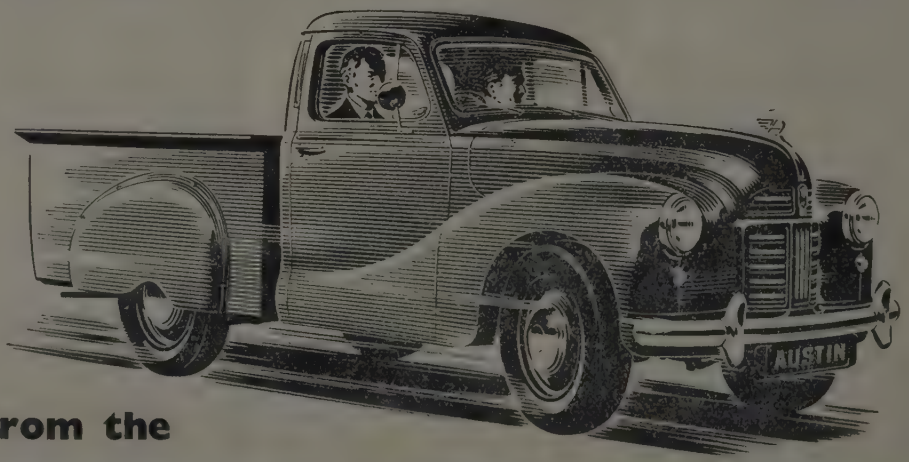

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[*National Publicity*

An apple tree trained as an espalier on a wire fence.

The best time to carry out summer pruning is after the shoots have passed the succulent stage; that is, when they have become woody. Not all the shoots reach this stage together and it is usual to spread the work over two or three operations. Knowledge of this technique can be used to advantage to induce fruiting earlier in young trees than it would occur under the more usual method of winter pruning alone.

Oblique Cordons

Trees to be trained as oblique cordons are planted in rows 15in. to 18in. apart. They are inclined at an angle of 45 degrees, though this may be lowered a few degrees when the trees are older to allow more room. Cordons are tied to wires or fences or any other suitable support. The main stem of the cordon is called a leader. This should not be cut but allowed to grow for extension of the tree height. If the leader becomes damaged in any way, it should be shortened to a suitable nearby shoot which can take over the main growth without losing too much shape.

Summer Treatment of Lateral Growth

Young laterals can arise directly from the main stem and from spurs. The summer treatment of the more vigorous of these shoots can be completed in one operation, the most favourable period being about mid-January. Erect growth from vigorous laterals should be removed irrespective of its point of origin. Laterals more than a foot long arising from spurs should also be removed. Unwanted features such as crossed laterals where rubbing occurs should be rectified by removal of one of the laterals. When these unwanted shoots have been removed all remaining laterals should be shortened to 4 or 5 buds (usually 2in. to 3in.). This induces short new growth, which is conducive to the development of fruiting buds.

Dwarf Pyramids

The main difference between the pruning of dwarf pyramids and cordons arises from the shapes of the two types of tree. The mature dwarf pyramid tree has a single main stem which stands erect and is about 5ft. to 7ft. tall. Arising from this are numerous short branches, the longest of which is about 4ft. These long branches are the lowest ones, the shorter branches being near the top of the tree. The branches are all held at a wide angle (between 60 and 90 degrees). Such widely angled branches are less likely to make vigorous growth and are therefore relatively more inclined to set fruiting wood.

With new trees laterals are produced after the reduction of tree size during winter. The fact that the tree has been reduced at the start means that more vigorous growth is probable, and the chances of early fruit bud formation are not as good as they are with the cordon system. Summer pruning of dwarf pyramids during mid-January is normal as long as a reasonable amount of new wood is being produced.

Laterals over 18in. long, with the exception of those needed for leaders, should be shortened to stubs 2in. to 3in. long. Very erect laterals more than 12in. long should be removed, but laterals less than 12in. long may be left uncut. Leaders which are fully grown and are not required to progress further should be cut back to older wood, leaving a weak growth uncut in the terminal position. Similarly if the tree is considered tall enough, the top of the central leader should be cut back into older wood, a weak shoot or spur again being left in the ascendant position.

Stub systems (that is, the longer laterals which have been reduced to 2in. to 3in.) which continue to make vigorous growth after 3 or 4 years and fail to form fruit buds should be removed. Stub systems which have one or two fruit buds should be reduced by removing the parts without fruit buds. It is not uncommon to find the top of a dwarf pyramid tree more vigorous than the bottom and most of the summer pruning of such trees will be done at the top.

Espaliers

Leaders of trees trained on the espalier system are usually supported on fences or against buildings. Shaping of espaliers is not difficult. Most leaders which are allowed to grow without cutting are trained at right angles to the main trunk along various types of support. Upright shoots over 12in. long are removed and only the leaders growing parallel or nearly parallel to the supports are left. Fruiting laterals rise from these leaders and should be summer pruned to produce fruit spurs in a manner essentially similar to that described for cordons and pyramids.

With the espalier system fruit spurs and buds tend to be crowded more closely than in other systems, but this is not considered a disadvantage in this type of tree training.

Care of Livestock during December

Contributed by the Animal Research Division

DAIRY production for the year can be materially affected by feed conditions during summer. Cows fed poorly now not only produce less milk during summer, but will dry off earlier in autumn. Dairy statistics show that long lactation is very important, so the feeding of silage or other supplementary milk-producing fodders should be started as soon as pasture begins to dry off. It should never be left until milk production begins to show a material fall.

DAIRY COW NUTRITION

Farmers who wish to eradicate foot-rot from their flocks should obtain a copy of Department of Agriculture Bulletin No. 325. This is the season in which the eradication campaign must be planned.

FOOT-ROT CAN BE ERADICATED

So-called roup is often fowl pox. Specimens should be sent to the Department of Agriculture Animal Research Station, Wallaceville, for diagnosis. Outbreaks of this disease can be prevented by vaccination, full details of which may be obtained from the nearest Poultry Instructor.

FOWL POX

Farrowed sows should receive a daily ration of 4 gallons of skimmed milk plus 2/3 gallon for each pig suckled. Newly weaned pigs should not be overfed; 1½ to 2 gallons per day in three feeds is adequate for the first 14 days. The ration can then be slowly raised to reach 2½ gallons at the end of the first month, and after the first fortnight the number of feeds can be reduced to two per day. Replacement breeding stock should be selected from the bacon pens, and only the fastest-growing sows with good strong feet and at least 12 well-placed teats should be chosen.

PIG PRODUCTION

If cows are returning to service, the mating records should be examined to see if any particular bull is to blame. If this is so, it is wise to have a veterinarian or Livestock Instructor collect a semen sample for examination. Care is necessary when purchasing replacement bulls. If possible, a young bull that has not been used previously should be bought. A bull should never be bought in the saleyard unless his full history is known. Washing out cows seldom helps and may cause trouble if irritant fluids such as kerosene are used. It pays to consult a veterinarian as soon as the cows are noticed returning to service in unusual numbers. He cannot be expected to diagnose the trouble months later.

COWS RETURNING TO THE BULL

If ewes with lambs are to be shorn, every effort must be made to reduce the time lambs are away from the ewes, as it is easy to dry ewes off at this time of year. They should be brought to the shearing shed in small mobs and should be dagged before reaching the board.

SHEARING

As each lot of lambs is sold the mothers should be drafted off together with any dry ewes which may remain in the flock. If feed is short and the ewes have very little milk, it usually pays to wean all the lambs, which can then be given the best grazing available. The ewes should be shorn and those which are to be retained should be placed on short pasture with ample water. This will help to reduce their condition and will result in a better lambing percentage in the following season.

CARE OF EWES AND FAT LAMBS

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during September and for the 2 months ended 30 September 1955, with comparative figures for the same month and 2 months of 1954, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
September 1955	16,765	299	17,064	—
September 1954	16,334	289	16,623	—
Increase or decrease ..	+431	+10	+441	+2.653
2 months ended 30/9/55	26,678	402	27,080	—
2 months ended 30/9/54	25,610	406	26,016	—
Increase or decrease ..	+1,068	—4	+1,064	+4.089

Butter in store at 30 September 1955 was 12,884 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage inc. or dec.
September 1955	6,639	539	7,178	—
September 1954	7,223	1,007	8,230	—
Increase or decrease ..	—584	—468	—1,052	—12.782
2 months ended 30/9/55	8,014	539	8,553	—
2 months ended 30/9/54	9,266	1,007	10,273	—
Increase or decrease ..	—1,252	—468	—1,720	—16.743

Cheese in store at 30 September 1955 was 10,335 tons

If these figures are converted into butterfat equivalent, there is an increase of 0.943 per cent. in butterfat graded for the 2 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.

Haymaking; Irrigation; Control of Crickets

Seasonal Notes by the Extension Division

CONSIDERABLE wastage results from surplus spring and early summer pasture growth. Retained in situ it makes poor winter feed and the rank swards produce little succulent feed in late summer. The patchy, stemmy herbage is of low feeding value and often smothers such desirable species as clovers. Weeds invade the resultant weak, open swards as the roughage dies down. On dairy and fat lamb farms grazing should be restricted to those paddocks on which growth can be adequately controlled, any excess roughage that tends to develop being topped with the mower. The remainder of fields should be closed for silage, hay, or grass seed production. On hill country surplus spring growth on spelled pastures permits clovers to reseed and provides useful cattle grazing, the areas being cleaned up in midsummer before the onset of dry weather.

HAYMAKING

GOOD hay can be saved only from good pastures mown early. Harvesting should begin when the bulk of the grasses are in flower. Clovers lose quality more slowly and may be cut when fully flowered, but the normal grass and clover sward should be cut according to the flowering of the grasses. Delayed mowing to get greater bulk results in poor hay.

To obtain quick drying, even curing, and minimum leaf loss the swath should be turned as soon as possible after cutting and once surface moisture has evaporated. If turning is left until a few hours before baling or stacking, exposed material becomes bleached while that underneath remains green and sappy. Should rain threaten, handling of the material should be avoided until the weather clears.

Baling or stacking should be begun once the material dries but still retains some natural greenness. If the hay is baled on the green side, bales must be stooked in the field for several days and then stored with sufficient interbale air space to prevent overheating. Good hay well cured and correctly stacked with adequate protection and fed as a supplement to pasture or forage crop is a most valuable winter feed for sheep and cattle. A reserve of good hay will prove invaluable in any feed shortage emergency at any season of the year.

—J. R. MURRAY

* * *

IRRIGATION: UNEVEN WATERING

THE main object of irrigation is to rectify a natural deficiency of soil moisture, thereby maintaining an improved supply of available plant foods during dry periods. Any pronounced unevenness in the application of irrigation water must ultimately affect the pasture or crop. Too much water is often as serious as too little, because over-saturated soils are often as harmful to useful plant growth as soils containing insufficient moisture.

Wild flooding and spray irrigation carried out when strong winds affect the sprinklers may result in uneven applications, but this problem can arise in any system. Principal causes of uneven watering are: Irregular soil surfaces with high and low spots throughout the watered area; soil type variations with soils of different permeabilities; excessively long borders, when portions near headgates tend to be over-watered and those at the far ends inadequately supplied; inadequate drainage that fails to remove excess water; using one headgate supplying two borders on soils not naturally free draining—soil near the headgate often becomes waterlogged; applying water to excessive growth that impedes even flow and distribution; errors of judgment in applying too much or too little water to any one border or in attempting during periods of water scarcity to use the limited amount of water available on too great an area.

The ultimate effect of continued uneven watering is decreased herbage production and deterioration in sward composition with consequent weed invasion, often aggravated by insect attacks, to which unthrifty plants are most susceptible.

—R. C. SCHOFIELD

* * *

CLOVER RESEEDING BY SPELLED PASTURES

THE spread of white clover in hill country swards can be readily achieved by spelling a clover area during the plants' flowering and seed-setting stages and by subsequent regulation of grazing management. Once certified strains have been established by oversowing, such areas should be well grazed during winter and spring right through to November, the normal flowering period for less desirable, volunteer types. The better, more highly productive strains flower mainly in December and January. At this period all cattle should be removed and the pastures grazed leniently with sheep or preferably spelled entirely. Once the clover has set and matured seed the area should be grazed, with cattle if possible.

By regulated grazing viable clover seed can then be transferred via the animal throughout the spelled area and on to adjoining, clover-deficient swards. When the clover seed has been transferred to new areas by this convenient means the establishment of plants can be assured by judicious grazing in the first growing season and by topdressing.

—F. H. COLLIN

* * *

CONTROL OF CRICKETS

LAST season crickets again plagued many parts of Auckland Province. Dry seasons lead to open swards and crack formation in heavy clay soils. Soil cracking and crickets are almost invariably associated, the insects gaining refuge within the cracks from natural enemies. Where pasture damage results control is achieved by using poison baits.

Enough bait for 1 acre can be made with 24lb. of poultry mash, 4lb. of molasses, and 1/5lb. of D.D.T. Mix the D.D.T. powder and poultry mash thoroughly before adding the molasses, the molasses being dissolved first in hot water. Use added cold water to produce a fairly dry, crumbly mash.

If herbage is sparse on the area to be treated, sawdust may replace up to 50 per cent. of the mash. A concrete mixer is essential for preparing large quantities of bait, but it may prove difficult to attain a satisfactory mix for more than 1 acre at a time. Prepared bait is broadcast in the same way as oversown grass seed on the infected areas.

—G. L. BANFIELD

* * *

SWEET BRIER CONTROL

SWEET brier (*Rosa eglanteria*) is more resistant to foliage sprays than other woody perennials such as gorse and broom. Repeat applications are required for satisfactory kills. For the first treatment an oil-based ester of 2,4,5-T in water at 1 in 150 to 1 in 250 should be applied at the full-leaf, flowering stage. Spring and autumn sprayings are less efficient and require stronger solutions (1 in 80 to 1 in 100). Complete spray coverage is essential. Regrowths should be treated at full leaf development. Good control can be obtained from single applications with 2,4,5-T esters in diesel fuel at 1 in 25 as a basal spray, 1 pint of solution per plant being used. Basal dusting with C.M.U. at 1oz. per plant is also effective. Both basal treatments may be applied when the plant is dormant.

—A. R. DINGWALL

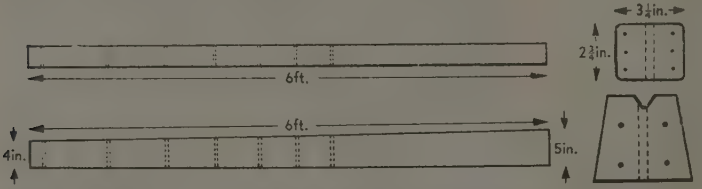
Pre-stressed Concrete Fence Posts

By H. W. T. EGGERS,
Engineer, Department of Agriculture, Wellington

AS the use of concrete posts for farm fencing is becoming widespread, farmers may be interested to know that concrete posts are now being produced which are approximately 40lb. lighter than normal posts yet are considerably stronger. This is made possible by the application to the manufacture of concrete fence posts of the reinforcing technique known as pre-stressing. A weight-strength comparison by the cantilever test between a pre-stressed concrete post and a good conventional concrete post shows that a pre-stressed concrete post, which weighs 50lb. compared to the 92lb. weight of a conventional concrete post, has a breaking strain of 420lb. compared to the breaking strain of only 300lb. of a conventional concrete post.

THE normal use of steel as reinforcing in concrete is to counter any tensile stresses imposed by loading. The principle of pre-stressing takes advantage of the greatest characteristic of concrete, its high resistance to compression, by applying a compressive load or stress to the concrete when it has matured sufficiently to take a loading.

This is accomplished in concrete fence posts by replacing the usual four ¼in. diameter rods with a number of high-tensile steel wires which pass through the moulds. The wires are subjected to a very high tension and then the concrete is cast round them. When the concrete has hardened sufficiently the wires are cut between the moulds and the tension to which they were subjected is transmitted to the concrete, which is held firmly in compression.



A pre-stressed concrete post (upper) and a conventional concrete post (lower).

A conventional concrete post which has broken up because the concrete cover was insufficient to stop corrosion of the rods.

A great drawback with conventional concrete posts is that very few manufacturers can guarantee the position of reinforcing rods inside the concrete. The concrete cover of the rods may be insufficient to prevent corrosion, which in time causes spalling of the concrete and consequent destruction of the post as shown in the illustration above. This action may take time to develop (the post shown had been in service 9 years), but once it starts destruction of the post is rapid.

Corrosion of the steel and consequent destruction of the post are extremely unlikely with pre-stressed posts, as each wire must be accurately placed, and as the wire diameter is much smaller it does not present the same surface area to corrosive influences.

At present pre-stressed posts are manufactured commercially only in very few districts, and cartage to other districts would make their cost uneconomic. However, arrangements are in hand to provide facilities to enable farmers in any district to manufacture their own pre-stressed posts at a small capital outlay for equipment. This work could be undertaken during winter, during wet weather, or at slack periods, and the cost per post could be considerably lower than for conventional concrete posts.

Any farmer who may be interested in home production of concrete posts utilising this modern technique can obtain details from the Engineer, Department of Agriculture, Box 2298, Wellington.

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Pints - -	£3 18s.	Pints - -	£3 12s.	Pints - -	£3 12s.

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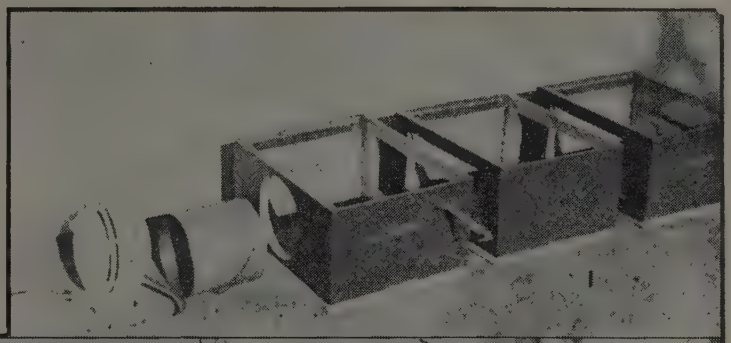
Substitute for a Beekeeper's Hot Room

MANY beekeepers who have not large commercial outfits have to face the problem, especially in the cooler autumn months, of warming up honey to uncap and extract it. This article by L. J. S. Line, Apiary Instructor, Department of Agriculture, Invercargill, describes a method of warming honey brought in cold from the hives and which can be used in a honey house where, perhaps for want of space, hot-room facilities are not provided.

THE arrangement is an electric fan radiator which blows warm air through a stack of supers so that when the radiator is switched on during the evening honey will be warm the following morning.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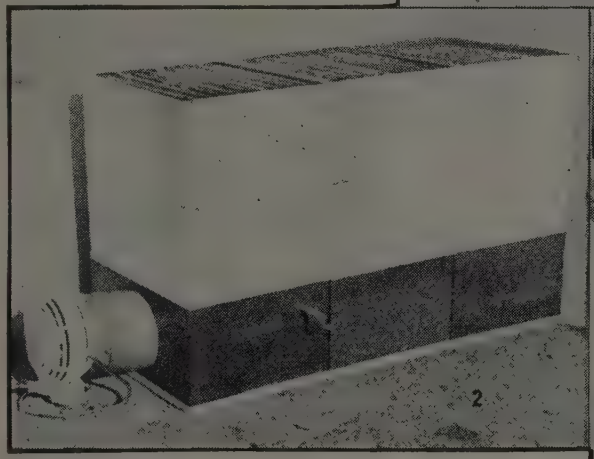
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1—The sections which form the heating unit separated. From left to right: Fan radiator, funnel, first super of wind tunnel with thermometer, and other boxes as required. 2—The heating unit assembled with 6 supers to be heated and the thermometer in place. 3—Clean hive mats placed over honey frames so that the warm air escapes at one edge and the corners.

This system was developed by Mr. J. McFadzien, of Henley, Taieri, who fashioned a wind tunnel which can be extended or reduced according to the number of supers to be heated. A wooden trough could be built as an alternative, and technically this would be what a pipe organ builder calls a "wind trunk". The illustrations show three of Mr. McFadzien's four empty supers with holes cut through the sides (not through the ends) and the last super (farthest from the radiator) having a hole on only one side. The super nearest the radiator has a circular hole which is the same circumference as a billy which will cover the face of the radiator, and this billy directs the air into the wind tunnel.

Fan Radiator

The type of fan radiator used may cost from about £8 to £20 and it is better to select one that has a high and a low heat switch and several fan speeds. The radiator illustrated is a 2-kilowatt type. Though it is shown attached to 3 piles of supers, heat is blown normally under 4 piles each of 5 supers. These 20 supers are equivalent to ½ ton of honey. At the end of the season, when the supers are lighter, they can be stacked higher.

The supers of honey to be heated are from hives where the honey has been placed over escape boards during the previous night. When the supers are stacked on the wind tunnel the radiator is turned on at full (2 kilowatt) strength for 1 hour. For the next 11 hours approximately the heat is reduced to 1 kilowatt.

The radiator shown has four fan speeds and the lower the speed is the

higher the temperature of the circulating air becomes. The fan is used mostly at the third highest speed. With this arrangement (using 1 kilowatt) warming cold honey to a condition where it will uncap and extract readily takes 12 hours.

If the weather, as well as the honey, is cold, full heat can be used for perhaps more than an hour, but not longer than is sufficient to produce 100 degrees on a thermometer which is inserted in the wind tunnel. A ½in. hole bored through the super nearest to the radiator easily provides for the insertion of the thermometer, which remains in place during the warming process and is very convenient. In operating this device there are a number of points worth attention:—

The thermometer should be carefully watched to avoid overheating. If the temperature rises much above 100 degrees, the combs may collapse.

To ensure an even distribution of warm air along the length of the tunnel some form of resistance such as zinc or wire queen excluders can be placed under the first one or two piles of honey nearest the heater; this causes a fair share of heat to travel to the farthest pile of supers.

The top layer of supers may be partly but not completely covered to hold the warmth inside the boxes, but some outlet must be provided at the corners and edges of the frames to allow a through current of air. This may be done simply by laying some new hive mats across the supers at right-angles to their normal position, as shown in the illustration on page 461.

All heating devices must be used with reasonable caution and if there is any doubt about the safety of apparatus, a sheet of asbestos should be used where insulation seems to be required. A heating unit in which the power will switch off if the fan stops, is preferable. It is desirable to have drip trays under the wind tunnel.

Flexibility

The unit can be planned to suit the needs of the beekeeper by having a shorter or longer wind tunnel than that illustrated to accommodate the number of supers to be heated. It can be moved to various positions in the honey house.

Another Function

Honey removed from hives during the cooler autumn months is sometimes insufficiently ripened, and this heating system is also effective in removing excess moisture from honey of low specific gravity. In such honey a longer period of treatment by the fan radiator will be required according to the condition of the honey.

The heating system should be a great advantage to beekeepers limited to working their hives at weekends and for honey removed toward the end of the season.

☆

Agricultural and Pastoral Show Dates

THE following are dates and venues of A. and P. shows up to the end of March:—

NORTH ISLAND

December

3 December—Hauraki A. and P. at Paeroa.
3 December—Kaikohe A., P., and H. at Kaikohe.
3 December—Helensville A. and P. at Helensville.

January

13 and 14 January—Wairoa County A. and P. at Wairoa.
20 and 21 January—Feilding I., A., and P. at Feilding.
21 January—Central Hawke's Bay A. and P. at Waipukurau.
*21 January—Whangaroa A. and P. at Kaeo.
27 and 28 January—Horowhenua A. and P. at Levin.
27 and 28 January—Rotorua A. and P. at Rotorua.
28 January—North Kaipara A. and P. at Paparoa.
*30 January—North Hokianga A. and P. at Broadwood.

February

1 February—Marton A. and P. at Marton.
3 and 4 February—Rodney A. and P. at Warkworth.
4 February—Rangitikei A. and P. at Taihape.
7 and 8 February—Dannevirke District A. and P. at Dannevirke.
10 February—Dannevirke Ram Fair at Dannevirke.
10 and 11 February—Taumarunui and District A. and P. at Taumarunui.
10 and 11 February—Taranaki A. and P. at New Plymouth.
11 February—Hukerenui A. and P. at Hukerenui.
11 February—Pahiatua A. and P. at Pahiatua.
*11 February—Galatea A. and P. at Galatea.
15 February—Te Awamutu A., P., and H. at Te Awamutu.
17 and 18 February—Ohura A., P., H., and I. at Nihoniho.
17 and 18 February—Franklin A. and P. at Pukekohe.
17 and 18 February—Masterton A. and P. at Masterton.
18 February—Northern Wairoa A. and P. at Mititai.
*18 February—Tauranga A. and P. at Tauranga.
*21 February—Otorohanga A. and P. at Otorohanga.
23 February—Matamata A. and P. at Matamata.
24 and 25 February—Wellington and Hutt Valley A. and P. at Trentham.
24 and 25 February—Te Kuiti and District A. and P. at Te Kuiti.
25 February—Te Puke A. and P. at Paengaroa.
25 February—Putaruru District A. and P. at Putaruru.

March

*3 March—Whakatane A. and P. at Whakatane.
3 March—Waiotira Junction A. and P. at Waiotira.
3 March—Mangonui County A. and P. at Kaitaia.
3 March—Albany A. and P. at Albany.
3 March—Waikato Central A. and P. at Cambridge.
*7 March—Morrinsville A. and P. at Morrinsville.
7 March—Opotiki A. and P. at Opotiki.
10 March—Hawke's Bay A. and P. at Hastings.
*17 March—Wellsford A. and P. at Wellsford.

SOUTH ISLAND

December

*3 December—Winton A. and P. at Winton.
6 and 7 December—Gore A. and P. at Gore.
10 December—Otago Peninsula A. and P. at Portobello
10 December—Wyndham A. and P. at Wyndham.
*13 and 14 December—Southland A. and P. at Invercargill.
17 December—Tokomairiro A. and P. at Milton.

January

14 January—Blueskin A. and P. at Waitati.
21 January—Peninsula H. and P. at Duvauchelle.
21 January—Waikouaiti A. and P. at Waikouaiti.
*21 January—Wallace A. and P. at Otautau.
28 January—Palmerston and Waihemo A. and P. at Palmerston.
28 January—Waiau A. and P. at Tuatapere.

February

2 and 3 February—Otago A. and P. at Dunedin.
11 February—Golden Bay A. and P. at Takaka.
*12 February—Inangahua A. and P. at Inangahua.
18 February—Banks Peninsula A. and P. at Little River.
18 February—Murchison A. and P. at Murchison.
*18 February—Central Otago A. and P. at Omakau.
*25 February—Kaikoura A. and P. at Kaikoura.
25 February—Maniototo A. and P. at Ranfurly.

March

3 March—Temuka and Geraldine A. and P. at Winchester.
10 March—Cheviot A. and P. at Cheviot.
10 March—Mt. Benger A. and P. at Roxburgh.
*13 March—Lake County A. and P. at Arrowtown.
17 March—Hawarden A. and P. at Hawarden.
17 March—Mayfield A. and P. at Mayfield.
17 March—Upper Clutha A. and P. at Wanaka.
*24 March—Methven A. and P. at Methven.

* The Department of Agriculture exhibit will be staged at this show.

1955 Porker and Baconer Competitions

ANALYSIS of the results of the pig carcass competitions conducted at Tomoana, Patea, and Westfield freezing works during 1955 reveals that though no appreciable general improvement in carcass quality has been achieved since 1950, when the last analysis was made, there has not been further deterioration. Further, it is shown that there exists within the stock being used in New Zealand sufficient genetic variability that if the best stock are selected and properly used, considerable improvement could be effected. The best pigs are better than ever and this represents the results of careful selection of breeding stock combined with increasing skill in feeding and management of those who have appreciated the need for and the means of securing improved carcass quality. Results are discussed in this article by A. Longwill, Superintendent, Pig Industry, Department of Agriculture, Wellington.

WINNING teams in the 1955 competitions scored exceptionally high points, but a careful analysis of the whole position, particularly to those characters judged on fixed measurement standards, shows that as compared with the measurements of pigs in the 1950 competitions no significant over-all improvement has been obtained.

The high points gained by the championship winners, particularly the baconers, emphasise, however, that the man who is interested in producing quality carcasses and has provided himself with breeding stock having the inherent qualities in respect of length, balance, and general conformation, particularly of hams and loin, can produce a quality baconer which will compete with any in the world. It also emphasises the possibilities that exist for others to emulate their example.

Feeding and management are of over-riding importance in the production of quality carcasses, but it will be worth while to study the characteristics of length and balance of the carcass, which are determined to a greater degree by the inheritance of the pig than are most of the other factors that make up the sum of carcass quality. Table 1 shows the average figures for length and depth of the carcasses within certain weight ranges (1950 figures are given for comparison). Any change that has taken place has almost invariably been toward improvement, but such changes are very small compared with the leeway to be made up.

Greater Length Needed

Lack of length is the main weakness revealed by Table 2. In fact, greater length must still be regarded as the first carcass-quality target. Depth in relation to weight of carcass is not excessive, but lack of length—from 1¼in. in light porkers to over 2in. in

Mr. F. A. Buckley with his grand champion baconer team, which scored 367 points. With a porker team which scored 329 points he also secured first place for combined porker and baconer teams.

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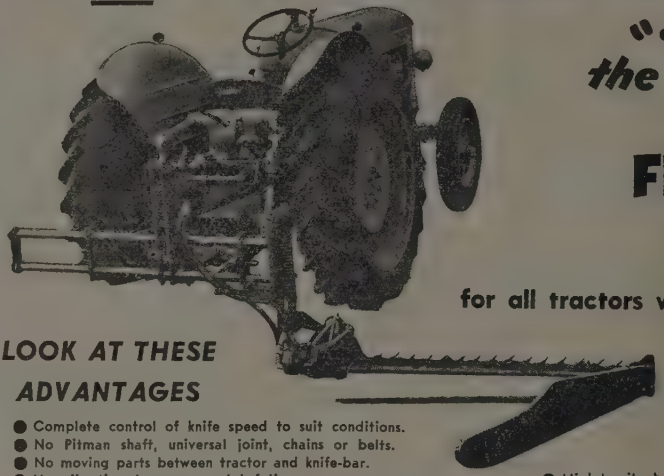

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Mr. W. G. Bell with his champion porker team, which scored 352 points. This was somewhat less than winning porker teams have scored in recent years.

150lb. to 160lb. baconers—results in many sides having poor balance.

Table 2 shows the body length for 2348 pigs in certain porker and all baconer weight ranges up to 160lb. The data have been tabulated on the basis of sex, as it is found that there is a consistent advantage of about ½in. in length in favour of gilts. Further, there is a substantial variation in length between the carcasses in each weight range, the longest carcasses in each weight range except the heaviest being up to the optimum length standard. The great majority fall well below this standard, however, some by as much as 4½in.

Light Porkers Good

The degree by which carcasses fall away from the standards set under the

TABLE 1—AVERAGE FIGURES FOR LENGTH AND DEPTH OF CARCASSES WITHIN CERTAIN WEIGHT RANGES IN 1950 AND 1955

		Weight ranges (lb.) 60/65	86/90	116/120	121/130	131/140	141/150	151/160
		in.	in.	in.	in.	in.	in.	in.
Average body length	1950	24½	26¾	28⅜	28⅝	29⅜	30	30⅜
	1955	24⅜	26¾	28⅜	29⅛	29⅝	30⅛	30⅝
Optimum body length		26⅛	28	30¼	31	31⅛	32	32⅛
Average chest depth	1950	10⅝	11⅛	12⅜	12⅝	12⅝	13	13⅜
	1955	10	11⅛	12⅛	12⅜	12⅝	13	14¼
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Average ratio of depth to length	1950	40.9	41.6	43.6	43.1	43.1	43.2	43.6
	1955	40.4	41.6	42.5	42.5	42.6	43.2	43.6
Optimum		40	40	40	40	40	40	40

TABLE 2—BODY LENGTH OF CARCASSES WITHIN CERTAIN WEIGHT RANGES

	Weight ranges (lb.) Porkers 61/65	86/90	116/120	Baconers 121/130	131/140	141/150	151/160
Gilts							
Number of carcasses	48	143	18	284	340	294	127
Body length (in.):							
Average	25	26⅞	28⅝	29½	29¾	30¼	30½
Longest	26⅝	28¼	30⅛	32	32	33⅜	32¼
Shortest	23¼	25	27	26¾	27	28	29
Barrows							
Number of carcasses	54	115	8	260	297	253	107
Body length (in.):							
Average	24⅝	26⅝	28¼	29	29½	30	30½
Longest	26⅝	28⅛	29	31⅜	31¾	32	31¾
Shortest	23¼	24⅝	27½	26¾	27½	27⅞	29
Optimum	26⅛	28	30¼	31	31½	32	32½

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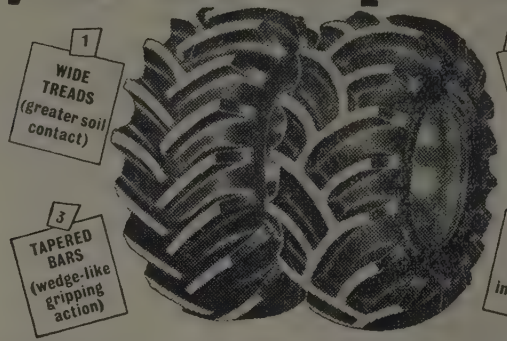

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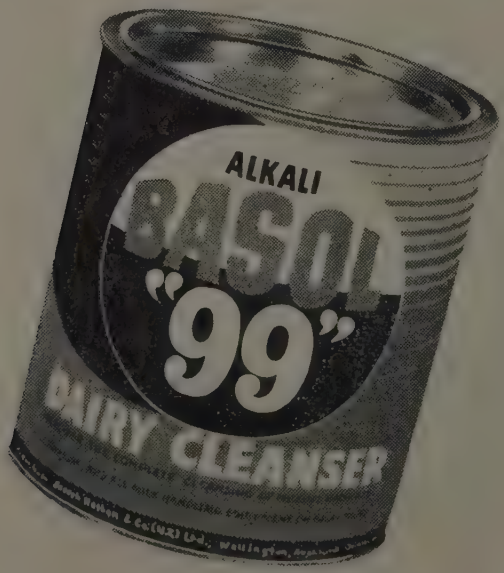

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SP.244

The judges in the North Island porker and baconer championships at Westfield freezing works. From left to right: Messrs. D. Young, G. Payne, J. D. Anderson, H. Traill, T. Marks, and F. Merritt.

national judging system (details of which are given in Department of Agriculture Bulletin No. 243 "New Zealand Baconer and Porker Carcass Judging Standards") increases with increasing weight. Table 3 shows that in length and balance light porkers (60lb. to 80lb.) leave very little to be desired. When the average measurement figures are converted to points the consistent advantage held by female pigs and the lighter weights is brought out very forcibly.

Breed Differences

An examination of the score for length and balance in some 1500 carcasses of which the breeding is known shows a clear advantage for the Large White breed. Large White crosses also show up well. Again the slight superiority of the females persists throughout. The advantage of the gilts appears most marked in the Tamworth breed, but since there were only 73 carcasses in this category, almost equally divided between gilts and barrows, the numbers are probably not adequate to give a true indication of the differences between sexes within the breed. Table 4 sets out the average points scored for length and balance in breed and sex groups.

Backfat Measurements

Though backfat thickness can be controlled by skilful feeding, the aver-

TABLE 3—LENGTH IN RELATION TO DEPTH FOR VARIOUS WEIGHT RANGES

		Weight ranges (lb.)							
		60/65	76/80	86/90	96/100	116/120	121/130	131/140	141/150	151/160
*Length	Gilts	25	26¼	26⅞	27⅜	28⅝	29¼	29⅜	30¼	30½
	Barrows	24⅝	26	26⅝	27⅞	28¼	29	29½	30	30¼
*Depth	Gilts	10	10⅝	11⅛	11⅝	12	12⅜	12⅝	13	13¼
	Barrows	10	10⅜	11⅛	11⅜	12⅛	12⅜	12⅝	13	13¼
		Points								
Length	Gilts	15	16	15	16	13	13	13	13	12
	Barrows	14	15	14	14	12	12	12	12	11
Depth	Gilts	5	4	4	3	3	2	2	2	1
	Barrows	5	4	4	2	1	2	2	1	0
Total points (length and balance)	Gilts	20	20	19	19	16	15	15	15	13
	Barrows	19	19	18	16	13	14	14	13	11

TABLE 4—AVERAGE POINTS SCORE FOR LENGTH AND BALANCE OF SIDE BY BREED AND SEX

Breeding	Gilts		Barrows	
	Length	Balance	Length	Balance
Possible points	20	5	20	5
L.W.	16	3.5	14	2.5
L.W. x B. or B. x L.W.	14	2.5	13	2
Misc. L.W. x	14	2	13	1.25
T. & T. x	15	2.5	11	0.25
T. x B. or B. x T.	13	1	12	0.5
Duroc & Duroc x	13	1.25	11	0.5
Misc. B. x	13	1	12	0.75
L.W. x T. or T. x L.W.	13	1.25	11	1
L.B. & L.B. x	13	1	11	0.75
B.	12	1	11	0.75
Av. of all pigs (1950 carcasses)	14	1.5	13	1.25

TABLE 5—AVERAGE BACKFAT MEASUREMENTS IN 1955 ACCORDING TO SEX

	Weight ranges (lb.)							
	Porkers							
	60/75		76/90		91/105		106/120	
	gilt	barrow	gilt	barrow	gilt	barrow	gilt	barrow
No. of pigs	306	293	534	441	170	158	69	58
*Shoulder fat	13	13.2	13.5	15.6	16.6	17.7	21.8	21.7
*Optimum	13-14	13-14	14-15	14-15	15-16	15-16	16-17	16-17
*Loin fat	7.2	7.4	8.1	8.5	9.4	9.6	11.8	11.9
*Optimum	8	8	9	9	10	10	11	11
	Baconers							
	121/130		131/140		141/150		151/160	
	gilt	barrow	gilt	barrow	gilt	barrow	gilt	barrow
No. of pigs	289	258	337	303	297	259	128	108
*Shoulder fat	26.5	28.8	28.2	29.2	29	30.3	30.4	31.5
*Optimum	20-23	20-23	21-24	21-24	22-25	22-25	23-26	23-26
*Loin fat	14.3	15.4	15.9	16.4	16.4	17	17.6	18.9
*Optimum	13	13	14	14	15	15	16	16

* Measurements in sixteenths of an inch.

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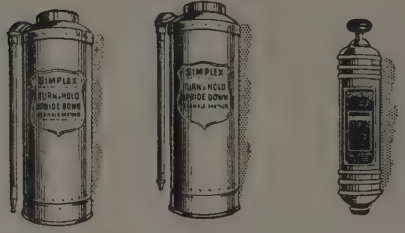

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age figures given in Table 5 for porkers and baconers give some indication of the characteristics of the pigs regarding stage of maturity.

These competitions indicate, as have previous ones reviewed, that at least up to 90lb. carcass weight pigs tend to carry less than the optimum backfat and that backfat at the shoulder reaches the optimum earlier than at the loin. At later stages the tendency is for backfat to be above optimum and to become progressively more excessive with increase in carcass weight.

Because of their greater length females tend to carry lighter backfat than males throughout the whole weight range. This is to their advantage only after the 90lb. dressed weight stage is passed and particularly in the baconer ranges. Careful research in Canada indicates that females have an 8 per cent. advantage in total carcass score over castrated males when all are killed at 200lb. liveweight.

There has been a slight over-all improvement in backfat score, as though the average measurements in the porker range are a little greater (thus bringing them nearer the optimum, except in the 106lb. to 120lb. range), those in the baconer ranges are slightly less. This reflects increased care in finishing the competition pigs and, though there is still much scope for improvement with baconers, means that the need for the production of leaner carcasses is being appreciated.

Very wide variations in actual backfat measurements in each weight range indicate that whereas the skilful feeder can secure the ideal finish at any stage, others err on either side of the ideal. Fewer feeders sent in under-finished baconers in the higher weight ranges than sent in overfat pigs in these ranges. There is need for more attention to the application of restricted feeding from 120lb. liveweight onward in pigs to be finished at baconer weights.

Eye Appraisal Points

Of the characters assessed by eye appraisal hams are most important. Since a fat ham is not required, hams will improve as backfat improves, as long as the development of lean meat is adequate. Breeding stock should

TABLE 6—TEAMS SCORING 70 PER CENT. OR MORE OF TOTAL POINTS IN GROWTH-RATE SECTION

Exhibitor	Breeding of pigs	Date of birth	Age at slaughter days	Average deadweight of 4 pigs lb.	Points		Total points as percentage of possible (520)
					Carcass (420)	Total	
Baconer Teams							
R. P. Kovaliski, Makaraka ..	L.W.	13/10/54	175	140¾	363	463	89
R. C. McGrannachan, Patutahi ..	B. x L.W.	27/8/54	173	143½	356	456	88
R. C. McGrannachan, Patutahi ..	B. x L.W.	27/8/54	173	134¾	343	443	85
H. E. Johnson and Co., Whangarei	L.W.	9/11/54	184	139	338	431	83
H. E. Johnson and Co., Whangarei	L.W.	26/10/54	177	138½	310	405	78
Fowell Bros., Howick	L.W. x B.	2/7/54	223	143½	342	384	74
B. S. Barkla, Hawera	B. x L.W.	9/6/54	232	145½	348	381	73
J. B. Topp, Ormond	L.W.	12/2/54	229	143¾	346	380	73
H. J. Tozer, Otorohanga	L.W. x B.	24/5/54	184	134	280	365	70
Porker Teams							
H. A. and A. D. Aitken, Waverley	L.W. x B.	4/11/54	118	79	343	443	85
N. E. Bull, Patutahi	L.W.	22/11/54	121	75½	344	435	84
P. H. W. Groves, Patutahi ..	B. x L.W.	5/10/54	120	78½	337	434	83
R. P. Kovaliski, Makaraka ..	L.W.	30/12/54	105	77½	329	429	83
L. Aitken, Waverley	L.W. x B.	11/11/54	118	71½	337	427	82
L. Aitken, Waverley	L.W. x B.	11/11/54	120	76½	332	426	82
R. G. Holmes, Galatea	L.W. x (B. x L.W.)	10/11/54	128	85½	329	425	82
Mrs. S. E. Edwards, Dannevirke	L.W.	9/12/54	118	78½	324	424	82
J. A. Risi, Ngaruawahia ..	B. x T.	12/2/55	116	80½	318	418	80
V. H. W. Groves, Patutahi ..	B. x L.W.	17/10/54	122	74½	332	417	80
K. Edwards, Dannevirke ..	L.W. x B.	4/12/54	116	85½	317	417	80
K. Edwards, Dannevirke ..	L.W. x B.	5/12/54	115	70½	323	414	80
J. A. Risi, Ngaruawahia ..	L.W. x B.	13/2/55	115	80½	314	414	80
A. T. Clements, Tirau	L.W. x B.	22/9/54	119	74½	319	412	79
Waldrom Bros., Waipawa ..	L.W. x B.	10/11/54	124	88	308	408	78
R. J. Bent, Otorohanga	L.W. x (Duroc x B.)	25/11/54	104	70½	307	407	78
R. J. Bent, Otorohanga	L.W. x (Duroc x B.)	10/10/54	101	74	306	406	78
T. R. Colebrook, Manutuke ..	L.W. x B.	14/12/54	113	81½	305	405	78
Mrs. S. E. Edwards, Dannevirke	L.W. x B.	8/12/54	133	81½	326	405	78
V. H. W. Groves, Patutahi ..	B. x L.W.	22/12/54	114	67½	316	404	78
A. W. Worrall, Whakatane ..	B. x T.	5/1/55	131	78½	323	399	77
Mrs. F. A. Buckley, Manutuke	T. x L.W.	30/10/54	137	76½	338	397	76
F. R. Holt, Te Kauwhata ..	L.W. x B.	11/10/54	119	70½	311	396	76
H. E. Johnson and Co., Whangarei	L.W.	7/1/55	125	84½	298	395	76
*R. A. Julian, Kakaramea ..	L.W.	17/11/54	132	82½	302	385	74
H. M. Winters, Tauranga ..	L.W.	10/10/54	122	77½	293	385	74
Fowell Bros., Whitford	B. x L.W.	28/12/54	98	76½	283	383	74
A. W. Worrall, Whakatane ..	B. x T.	5/1/55	131	71	325	381	73
A. E. Wood, Whakatane ..	L.W.	30/11/54	149	81	337	381	73
*R. A. Julian, Kakaramea ..	L.W.	16/12/54	146	78½	334	377	73
F. R. Holt, Te Kauwhata ..	L.W. x B.	30/10/54	121	71½	295	375	72
J. F. Bremner, Ballance ..	L.W.	19/11/54	137	74½	320	373	72
J. F. Bremner, Ballance ..	L.W.	23/12/54	131	72½	312	373	72
H. A. and A. D. Aitken, Waverley	L.W. x B.	14/9/54	126	69½	302	366	70
Teams Scoring 70 per cent. Carcass Points and 60 per cent. Total Points							
Baconers							
J. G. Fowell, Howick	L.W. x B.	26/5/54	225	144¾	314	356	68
*K. Barkla, Hawera	B. x L.W.	17/7/54	220	130	301	327	63
*R. A. Julian, Kakaramea ..	L.W.	29/6/54	248	143¾	318	325	63
Porkers							
A. E. Wood, Whakatane ..	L.W.	1/1/55	158	82	335	363	70
Est. J. Little, Ngaruawahia ..	L.W. x B.	27/9/54	162	74¾	308	317	61

* Whey feeder.

PIG COMPETITIONS . . .

be selected for hams which are thickly meated down to the hock rather than for rounded hams covered with fat. Lean meat development which is assessed also by eye requires selection of the strong-loined, flat-sided type of breeding stock as a basis. Good feeding in the early stages of growth to encourage maximum development of lean meat is essential to secure the full expression of the potentialities of the breeding stock.

Growth-rate Section

Though the number of teams in the growth-rate section was still not large, performances continued to improve. This was especially so in baconers this year, as some of the outstanding carcasses were from pigs which had been grown fully up to the standards set for rate of growth. This indicates that pigs of excellent baconer type and very profitable as feed converters are included in the baconer teams shown in Table 6, which includes all teams entered in the growth-rate section which secured 70 per cent. or more of the possible points for growth-rate and carcass quality combined.

***TABLE 7—TEAMS SCORING 80 PER CENT. OR MORE OF POSSIBLE POINTS FOR CARCASS QUALITY AND COMBINED TEAMS SCORING 75 PER CENT. OF AGGREGATE**

Exhibitor	Breeding	Points (possible 420)
Baconers		
F. A. Buckley, Manutuke, Gisborne ..	T. & T. x L.W.	367
Porkers		
W. G. Bell, Ardmore .	L.W.	352
N. A. Fraser, Kawakawa	L.W.	342
Combined		
F. A. Buckley, Manutuke, Gisborne ..	T. & T. x L.W.	696
A. E. Wood, Whakatane	L.W.	650
C. E. Sage, Massey ..	L.W.	633

* Table 7 does not include teams already shown in Table 6.

A larger proportion of the porker teams entered were able to reach 70 per cent. and a considerable number of these topped 80 per cent. The prominence of the Large White and Large White crosses in this section indicates that this breed has more to commend it than carcass points alone.

It is hoped that more entries will be received for this section in future, as the results mean a great deal in terms of all-round profitability. All that is required is a record of the breeding and date of birth, and almost all producers who are interested in improving the carcass quality of their pigs will be keeping records of this type already.

Carcass Quality

Table 7 gives a brief list of outstanding teams on carcass quality alone. This table includes teams which have secured 80 per cent. or more of possible points and which were not entered in the growth-rate section. Combined porker and baconer teams which secured 75 per cent. or more of aggregate points are also included.

All photographs by Sparrow.

Grading Points for Export Butter and Cheese

BUTTER-MANUFACTURING companies which obtained an average grade of 93.75 points or more and cheese-manufacturing companies which obtained an average grade of 92.50 points or more during the year ended 31 July 1955 are listed below in order of merit. Of the total listed the 27 butter factories and 20 of the cheese factories are in the North Island and the remaining 3 cheese factories are in the South Island. Production figures are for the balance-sheet year 1954-55 and the figures of quantities graded for export are for the period 1 August 1954 to 31 July 1955.

Creamery Butter

Factory	Registered number	Brand	Production	Graded for export	Average grade	Grading port
			tons	tons	points	
United ..	1,296	Whariti ..	653	203	94.403	Wellington
Te Aroha-Thames Valley ..	344	Overseas ..	3,587	2,830	94.381	Auckland
Cambridge (Hautapu) .	1,239	Cambridge .	2,805	1,548	94.331	Auckland
Cheltenham ..	3	Pakeha ..	1,599	972	94.214	Wellington
Konini ..	1,203	Konini ..	1,502	641	94.212	Wellington
Taihape ..	1,188	Tikapu ..	224	94	94.043	Castlecliff
Wangaehu ..	1,326	Wangaehu ..	566	395	94.021	Castlecliff
Kuku-Manakau	905	Ohau ..	596	411	94.008	Wellington
Levin ..	916	Lake ..	1,847	754	93.914	Wellington
N.Z. Dairy (Morrinsville)	415	Anchor ..	3,475	3,410	93.888	Auckland
Okitu ..	1,270	Okitu ..	151	85	93.885	Gisborne
Wairoa ..	1,345	Wairoa ..	596	133	93.880	Hastings
Awahuri ..	664	Red Rose ..	1,329	618	93.877	Wellington
Tararutangi ..	728	Champion ..	266	261	93.869	New Plymouth
Raetihi ..	717	Raetihi ..	299	178	93.866	Castlecliff
Rodney ..	394	Rodney ..	875	856	93.856	Auckland
N.Z. Dairy (Ngatea) ..	291	Anchor ..	2,108	1,995	93.822	Auckland
Ruawai ..	66	Ruawai ..	2,338	2,282	93.820	Auckland
Rangitaiki Plains ..	133	Rangitaiki Pl.	6,900	6,606	93.812	Auckland
Moa Farmers' ..	341	Inglewood ..	2,197	1,647	93.811	New Plymouth
Morrinsville ..	330	Lockerbie ..	4,912	4,807	93.805	Auckland
Apiti ..	414	Apiti ..	272	225	93.801	Wellington
Bay of Islands ..	1,312	Bay of Islands ..	1,801	1,535	93.797	Auckland
Mangorei ..	345	Mangorei ..	1,277	1,095	93.786	New Plymouth
N.Z. Dairy (Tuakau) ..	1,320	Anchor ..	4,294	3,958	93.764	Auckland
(Tauhiri) .	22	Anchor .	4,426	3,148	93.758	Auckland
Kia Ora ..	926	Kia Ora ..	946	511	93.750	Gisborne

Butter companies whose butter was graded mainly for the local market and for which an average grade of 93.75 points or more was obtained for the combined local and export gradings were as follows:—

Factory	Registered number	Brand	Production	Graded	Average grade	Grading port
			tons	tons	points	
Kaikoura ..	302	Kai ..	663	432	94.481	Lyttelton
Murchison ..	1,888	Airship ..	486	348	94.131	Lyttelton
Inter-Wanganui .	6	Inter-Wanganui .	437	267	94.121	Lyttelton
Westland ..	145	Westland ..	809	580	94.084	Lyttelton
Golden Bay .	146	Sovereign ..	958	877	94.001	Lyttelton
Collingwood .	1,254	Golden Hills	497	444	93.920	Lyttelton
Karamea ..	1,570	Karamea ..	416	328	93.798	Lyttelton

Cheese

Factory	Registered number	Brand	Production	Graded for export	Average grade	Grading port
			tons	tons	points	
Wright's Bush	206	Wright's Bush ..	179	179	93.000	Bluff
Dalefield ..	9	Dalefield ..	1,287	1,263	92.921	Wellington
Parkvale ..	1,240	Parkvale ..	396	373	92.903	Wellington
N.Z. Dairy (Komakorau)	220	Anchor ..	858	842	92.838	Auckland
Kaupokonui (Oeo) ..	1,132	Kaupokonui	667	670	92.828	Patea
Warea ..	87	Warea ..	693	690	92.761	New Plymouth
Maketawa ..	342	Maketawa ..	636	611	92.732	New Plymouth
Bruntwood ..	1,534	Bruntwood .	898	879	92.720	Auckland
Riverbank ..	985	Riverbank ..	431	426	92.707	Wellington
Kaupokonui (Skeet Rd.)	174	Kaupokonui	819	819	92.637	Patea
Mells ..	764	Mells ..	589	582	92.636	Patea
T. L. Joll (Tempsky Rd.)	1,862	Maori Chief	521	520	92.631	Patea
Westmere ..	1,621	Westmere ..	392	394	92.626	Castlecliff
T. L. Joll (Palmer Rd.)	487	Maori Chief	446	439	92.580	Patea
Oaonui (Kina Rd.)	283	Oaonui ..	456	444	92.578	New Plymouth
Manutahi ..	495	Manutahi ..	571	575	92.573	Patea
Oxford ..	15	Oxford ..	461	459	92.549	New Plymouth
Woodville ..	1,892	Woodville ..	536	297	92.546	Wellington
Drummond ..	1,823	Drummond ..	67	67	92.542	Bluff
Alton ..	1,890	Alton ..	798	798	92.540	Patea
Whenuakura ..	1,237	Whenuakura	945	945	92.525	Patea
Woodlands ..	1,485	Woodlands .	216	220	92.503	Bluff
Massey ..	16	Massey ..	45	30	92.501	Wellington

The Home Garden in December

THOUGH there are plenty of vegetables in most home gardens in December and the greater part of the main-crop planting and seed sowing is completed, vegetables for winter use should not be overlooked. In most districts plants such as winter cabbage, broccoli, brussels sprouts, kale, and leeks for late autumn and winter use should be set out late in December or in January. In this article A. G. Kennelly, Horticultural Instructor, Department of Agriculture, Dunedin, discusses some of the work in the home garden in December.

WEED killing is still necessary even among established crops, as weeds not only deprive crop plants of food and moisture, but are often the means by which insect pests and diseases are carried over from season to season. Hoeing is usually the most effective way of controlling weeds among crops.

Liquid manure can be applied with advantage to most crops in ground lacking plant food, and where necessary watering or irrigation should be attended to. The supply of water is particularly important to the growth and setting of beans, to the growth of lettuce and celery, and to only a slightly less extent to that of other greens.

Tall crops such as runner beans are best staked. Most varieties of tomatoes require pruning, staking, and tying, and, except in some southern districts, spraying with D.D.T. against caterpillars and with Bordeaux mixture or suitable Government-certified substitute against fungous disease. The pulling of main crop rhubarb should be discontinued.

Celery should be sprayed with captan or bordeaux mixture or a suitable substitute even before leaf spot appears, and in the more humid districts potatoes should be sprayed with bordeaux mixture or copper oxychloride. Potato tubers should be kept well covered and the soil moulded to as sharp a ridge as possible. Swedes, turnips, and peas should be sown if the supply of moisture can be assured. Parsnips can still be sown, though it is rather late for this in southern districts unless growing conditions are very good.

Asparagus

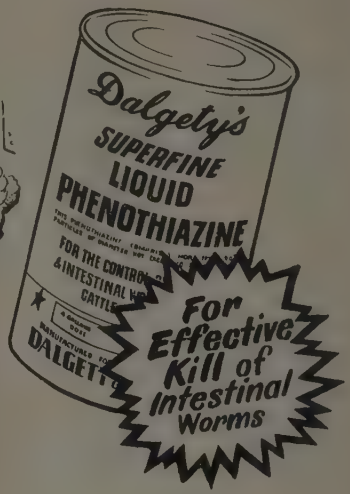
The cutting of asparagus shoots usually ceases about the end of November or middle of December according to district and the beds should then be cleared of weeds and cultivated. Cutting should not be continued too long or future production may be impaired.

A complete fertiliser scattered over and worked into the bed at the rate of 1½oz. per square yard will stimulate development of the strong, healthy fern growth, by which the roots are enabled to store up food for next season's growth. Strong fern growth also assists the suppression of weeds, so that the beds should require little further attention during summer.

Carrots

Small successional sowings of carrots can be continued or the main crop can be put in now. Carrots are a useful vegetable for winter, and where there is sufficient moisture in the ground December sowing is satisfactory. Dry conditions check growth, and affected young plants quickly succumb if aphides attack them. December or January sowings of intermediate or stump-rooted kinds usually result in the production of good-quality roots in late autumn, whereas roots from earlier sowings have by that time usually become large and may be rather coarse.

A close watch should be kept for aphis attack. Carrot aphides are small, globular, and green or yellowish-green and may be wingless or have four transparent wings. They suck the sap and stunt growth, so that young plants may wilt in hot weather.



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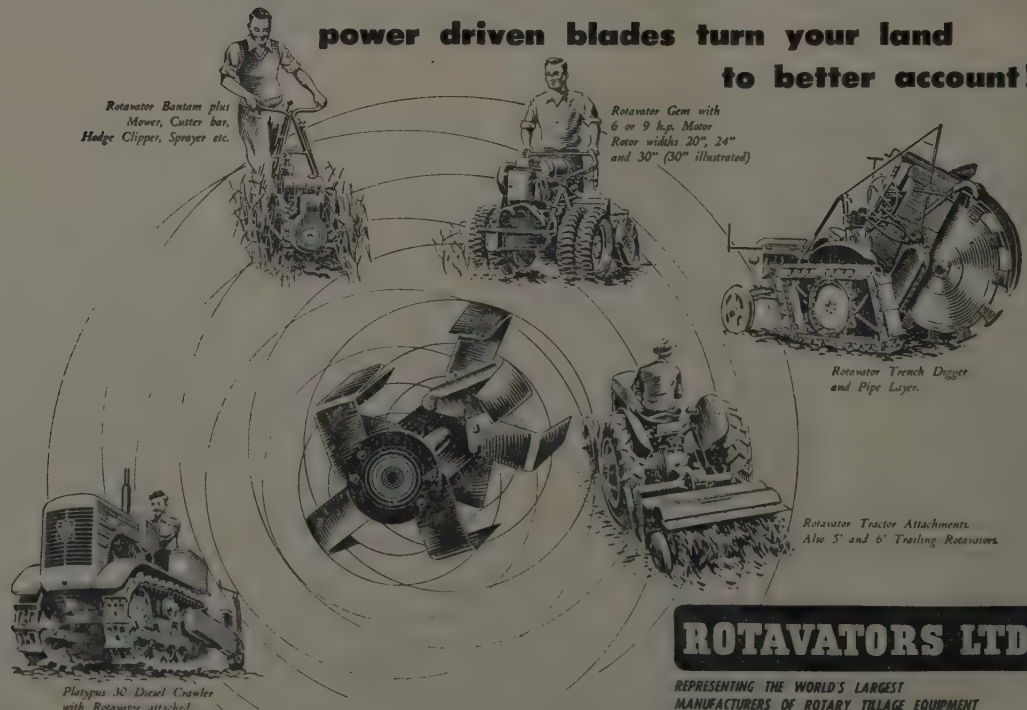

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The tiny, white specks present are the cast skins of the aphides. The foliage may change to a bronze, bluish, or reddish hue and the leaves and petioles become distorted. Aphides can be controlled by spraying with nicotine sulphate or H.E.T.P.

The carrot rust fly also is troublesome in some districts at this time of year. The adult fly is about 1/3in. long. It has a yellowish head, yellow legs, and one pair of wings and lays its eggs near the crown of the carrot. The larvae or maggots are slender, creamy white, rather rigid, legless, and up to ¼in. long; they are broad at one end and taper off to a slender head. After hatching the larvae burrow down and attack near the tip of the taproot, leaving rusty brown tunnels, which at first are only near the surface of the carrot. Young carrots may wilt or die. Control consists mainly of treating the seed with lindane and later with regular spraying with lindane. Spraying any nearby hedges with D.D.T. is of some value.

Celery

December and January are the preferred months for setting out celery. Most seedsmen sell boxes or smaller lots of the self-blanching varieties such as Golden Plume and Golden Self-blanching and the older varieties such as Solid White, which are not usually so much in demand, as they are more difficult to blanch successfully.

For most home gardeners the purchase of plants from seedsmen is preferable to raising them from seed, as few gardeners, except perhaps those in the warmer, more sheltered districts, can sow and raise the plants successfully without a frame or small glasshouse. The seedlings should be thoroughly watered before they are set out as advised in last month's "Journal".

Kohl Rabi

Kohl rabi is not commonly grown in home gardens in New Zealand, though it deserves to be, as it is more tolerant of dry conditions than are turnips. It belongs to the cabbage family and many people consider that its flavour is superior to that of cabbage, as it combines the flavours of both cabbage and turnips. It is usually treated as a root vegetable, though it is not a root vegetable in the sense that carrots and turnips are, as its bulbous edible "root" is an enlarged stem which forms above the ground.

To secure tender, succulent bulbs kohl rabi should be grown quickly. It should not be allowed to grow beyond 2½in. to 3½in. in diameter, because if left to reach maturity, it becomes tough and stringy. It grows well in a soil that is well drained and reasonably rich in humus. Though kohl rabi is often classed with turnips, it does well under a wider variety of conditions; generally its requirements are more similar to those of summer and autumn cabbage.

The aim of cultivation of potatoes is to destroy weeds, to keep the tubers covered, and usually to maintain good ridges.

Kohl rabi is usually grown as a cool-weather vegetable, but is very useful as a substitute for turnips during hot, dry weather, when turnips are likely to fail, though even kohl rabi should not be permitted to become too dry or it may have a bitter flavour. Because of kohl rabi's superiority over turnips in withstanding dry conditions, December and January sowings of kohl rabi are often favoured. It is very hardy and late summer sowings may be pulled as required until late spring. The bulbs do not keep well in store.

Seedlings transplant well, but it is usually preferable to sow the seed ½in. deep in rows 12in. to 15in. apart and later thin the plants to stand 6in. to 8in. apart in the rows rather than to transplant them. Plants mature in from 8 to 12 weeks from sowing.

Good varieties include White Vienna, Purple Vienna, and Short Top Green.

Lettuce

Lettuce cannot be grown successfully under dry conditions. If the soil is aerated, well drained and cultivated and rich in humus, the crop responds well to irrigation or watering, provided the soil does not set hard afterward. Crisp, sweet, and tender heads can be produced only by quick growth, which may be induced in poorly manured soil by organic liquid manure or by liquid manure made from nitrate of soda or sulphate of ammonia at 1oz. to 2oz. to 4 gallons of water.

In the hotter or drier districts at this time of year it is preferable to sow the seeds thinly (¼in. deep in rows 12in. apart) and later to thin the plants to 9in. apart in the rows rather than to transplant them. The rows should be watered after thinning to settle the soil back round the plants that are left, as otherwise they may receive a check which may later result in premature seed development.

Varieties are available to suit various climatic conditions in New Zealand. In the warmer districts varieties such as Great Lakes, Imperial 847, or New York 515 (Webbs Wonderful) are especially suitable.

Mustard Greens

Alternative names for mustard greens are Chinese mustard and mustard spinach. Mustard greens are hardy, useful, and easily grown forms of greens that deserve to be more widely grown in home gardens. Though they are not commonly grown, they are not new. The improved strains now available and the modern appreciation of the value of fresh vegetables have made them better known.

There are several kinds of mustard greens—loose-leaved, broad-leaved, and curled types. The variety Tendergreen, which is also known as mustard spinach, is particularly fine. It has dark green, rather thick, fairly smooth, spoon-shaped leaves and combines the flavours of mustard and spinach. As it is slow to seed, its sowing in the

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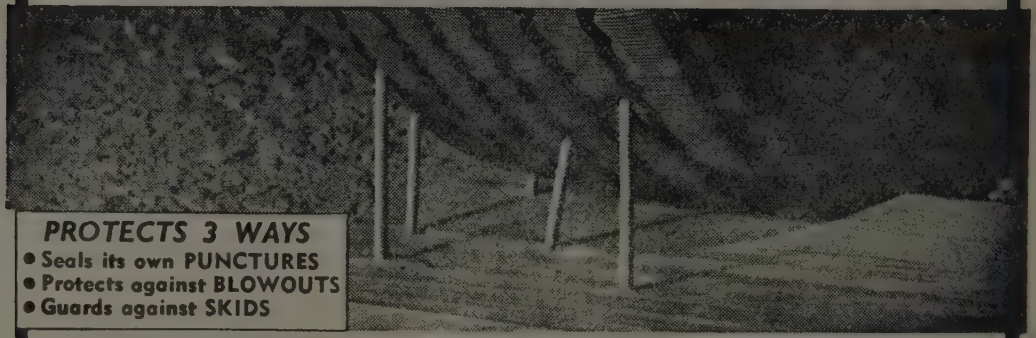

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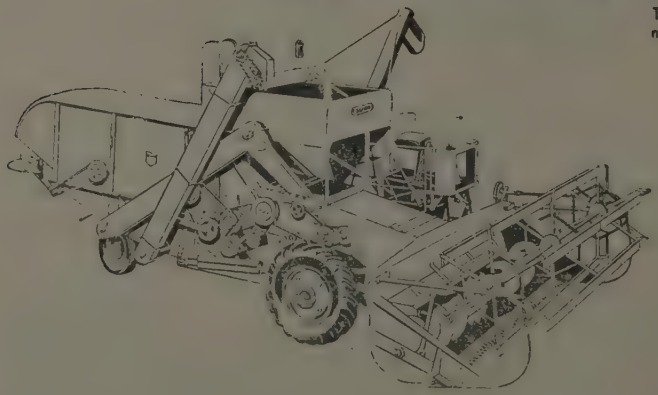

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hotter, drier districts need not be confined to spring and autumn, as is advisable with some of the other varieties. A hearting variety (Hearting Chinese Mustard) is also sold by some seedsmen. The leaves grow 12in. to 14in. long and the hearts, which are about 6in. to 8in. across, blanch well. The flavour of most varieties is mild.

Though some varieties will grow fairly well in the poorer soils, for best results it is advisable to grow them in rich, moist soils and in moderately cool conditions. The open varieties particularly are an excellent substitute for spinach and should be gathered in the same way, though the leaves are larger than the largest spinach leaves. Thinnings should be pulled first and used with the roots cut off, and later when the remaining plants are large enough a few of the largest leaves can be taken off as they develop. They can be removed with the fingers or a pair of scissors and should be used when young and tender; they can be cooked like spinach or used in salads.

Early thinning of seedlings gives the remaining plants a better start.

New Zealand spinach is one of the most useful plants for summer greens.

Seed should be sown ¼in. deep in rows 15in. apart. Seedlings of the open-leaved kind should be thinned to 6in. apart in the rows and of the hearting kind to at least 9in. apart under favourable conditions. The crop should be ready for use in from 35 to 45 days from seed sowing.

New Zealand Spinach

New Zealand spinach, which is a half-hardy, trailing annual with large, succulent leaves, can still be sown. It is not a true spinach, but is valuable for use in hot, dry, sunny situations and is often preferred because it lacks the peculiar bitterness of true spinach. Growth is rapid at this time of year in most soils, but it responds best to a light, fertile soil in a sunny position with adequate moisture.

New Zealand spinach is harvested by pinching off about 3in. of the growing tips, which forces new shoots to develop, so that when established the plant has a multitude of tips for gathering. It grows quite large and should be given a spacing of at least 2ft. each way.

Seed, which is usually rather slow to germinate, should be sown 1in. to 1½in. deep not more than a week before frost danger is past. Two or three seeds should be sown together at each spacing and the weaker seedlings removed after establishment.

Parsnips

Though parsnips are not usually lifted until early winter, it is rather late for them to be sown in most southern districts. They can still be sown where, as in northern districts, the autumn is sufficiently long to enable the plant to develop fully before winter stops growth.

Hollow Crown is a popular variety.

Radishes

Small successional sowings of radishes should be made as required. Cultural requirements for them are similar to those for carrots and beet, but as the crop matures much more quickly, it is more sensitive to adverse conditions. The soil should be well drained and the top 6in. cultivated to a very fine tilth. It should be very rich in fine, well-rotted organic matter; well-rotted compost is excellent.

Seeds should be sown thinly (12 to 15 to 1ft.) ¼in. deep in rows which need be only 4in. to 6in. apart. The soil should be gently firmed after sowing, as the roots do not "bulb" well in loose soil. Seed can also be sown broadcast, but weeding is then more difficult.

Roots should never dry out and in mid-summer shelter from the sun is advisable. This is best achieved by sowing in the shade of a taller crop.

The value of radishes lies in their fresh crispness and mild pungency. Pungency and fibre are, however, so greatly increased by slow growth or checks that in adverse conditions they are likely to be hot, pithy, and indigestible.

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Winter Vegetables

Brussels sprouts, kale (borecole), savoy cabbage, and broccoli (heading and sprouting) deserve more attention than they receive in most home gardens. They are high yielding and after establishment require comparatively little attention. The soil should be enriched some time before planting by the thorough incorporation of well-rotted organic manure. Fairly heavy loams that are well drained and suitably enriched are usually preferable.

Only a proportion of home gardeners sow seed; most purchase plants, which are available from most seedsmen, for setting out now or in January. The roots of plants of the cabbage family should be puddled in muddy water if there is a risk that they may become dry during planting.

If cabbage aphides, diamond-backed moth, and white butterfly are troublesome, the plants should be dipped in a solution of nicotine sulphate and D.D.T. Where aphides are not troublesome the nicotine sulphate need not be used.

Brussels Sprouts

Brussels sprouts have a well-deserved popularity and are not difficult to grow. The main needs are a deeply cultivated, rich, firm soil, adequate moisture, good spacing, a long season of growth, and, where grey aphides are troublesome, regular and thorough spraying with nicotine sulphate or H.E.T.P.

Purchase of good strains of plants is important. In New Zealand varieties are rarely classified, but overseas they are usually listed according to height and occasionally to maturity. Good types of brussels sprouts should form sprouts early and uniformly and sprouts should last well without bursting. They should be set closely, but not so close that picking is difficult, and should be firm, large, round, compact, and a healthy green. Plants should also be resistant to adverse weather and aphides (some stocks are more resistant to aphides than others).

Brussels sprouts succeed on a wide range of soils, but if grown on land too rich in nitrogenous material, they usually grow rankly and produce many loose, open, poor sprouts. Soil richly manured with organic material for a previous crop is best, and for the growth of the sprouts it can be dressed with artificial manure, as too much organic matter may tend to make the soil spongy, and firmness is required for good sprouts. A complete fertiliser (one containing nitrogen, phosphorus, and potash) usually gives the best results, though the dressing in most cases should be highest in phosphoric acid, which can be supplied by applying superphosphate.

Tomatoes and runner beans usually grow well against or in the shelter of a fence facing north.

In home gardens where space permits and brussels sprouts are appreciated several crops can be grown each year. A first sowing made under glass in August can be followed by one or more successional sowings, the last usually in November, provided that in southern districts there is a sufficient period for the plants to develop fully before winter.

Varieties include Scrymger's Giant, Long Island Improved, and Cambridge varieties in several numbers.

Broccoli

The common broccoli is for all practical purposes a hardy winter cauliflower and does not differ from the cauliflower usually grown for summer use except in hardiness and stronger development (in most varieties) of the leaves encircling the head. Varieties are available which mature in from about 5 to 12 months. Transplanting is usually done in December or January, but in districts having a long mild autumn or where conditions are moist and reasonably free from severe frosts some varieties can be set out in February.

Except for weed control and, where weather is boisterous, a certain amount of earthing up of the stems to stabilise the plants broccoli planted in rich, well-drained, and well-cultivated soil require little attention. As the curd begins to develop a leaf or two should be bent over it to give protection from frost.

Modern strains of broccoli produced by reputable seed firms are on the whole fairly reliable and start to head in according to their specified maturity periods, but unseasonable weather, particularly if it is sunny or moist and warm, is always liable to alter the timetable. Varieties should be chosen to mature successionally to provide supplies over as long a period as desired.

Non-heading Varieties

There are three kinds of non-heading, sprouting, or Italian broccoli—green, white, and purple. They produce a terminal main head on a fleshy,

Celery can be planted now in prepared beds or trenches if there is adequate moisture available. Regular spraying with bordeaux mixture or copper oxychloride is advisable where leaf diseases are troublesome.

branching stalk. After the main head has been removed side heads or shoots continue to form on most varieties and may be picked for a considerable period. Varieties of sprouting broccoli vary in time to reach maturity from about 3½ to 12 months. The quick-maturing varieties are treated like cabbage and the slow-maturing ones usually like broccoli. Heights vary from 15in. to about 36in.

Varieties include Italian Green Sprouting (Calabrese), Early Purple Sprouting, Late Purple Sprouting, and White Sprouting.

Kale or Borecole

There are several varieties of kale, but Scotch kale or borecole is most commonly grown in home gardens. The kales are very hardy and cultivation of most varieties is similar to that of brussels sprouts. They deserve to be more commonly grown in New Zealand gardens, because good strains are among the most delicious and health giving of vegetables. Unfortunately the growing of strong-flavoured, coarse-leaved kinds has been responsible for much prejudice against kale. Home gardeners should endeavour to select reliable seed of a suitable variety.

Kale matures according to variety and conditions in from 2 to 5 months and is grown mainly as a winter vegetable. Of the older types, asparagus kale, which has distinctive, long, thin shoots that resemble sprouting broccoli rather than asparagus and produces its edible branches in spring, is one of the best for the home garden. It has an excellent flavour and stands through winter, coming into bearing in spring, when most gardens are rather bare of greens. Fine-curled strains and Scotch kale of British origin are among the most useful vegetables in the home garden.

Generally the common varieties fall into two groups: Dwarf, about 12in. to 24in. high, and tall, about 30in. and higher. Plants should be set out 18in. to 24in. apart (according to height) in rows 30in. apart.

Leeks

Though leeks can be set out earlier and (in districts where autumn is sufficiently long) later than December and January, these are the preferred months for planting. A good plan is to have two or more plantings. In most districts an early, a mid-season, and a late planting will ensure a supply of leeks from autumn until late spring.

Leeks are a great standby and are very easily grown. They are rarely affected by insect pests or disease, and though cabbage and cauliflower (or broccoli) mature according to their season and are available or in best condition only then, leeks will stand for many months and may be used as required.

Plants can be set out 6in. to 8in. apart in rows 12in. apart. A trench 3in. to 4in. deep can be drawn out with a hoe and holes made with a dibble somewhat deeper than the white portion of the plants to be set out so that the plants can be dropped in the holes and left with portion of the green tops (the ends of which should be cut off) protruding. If the plants are then watered, it will not be necessary to fill the holes, as the soil will gradually erode and fill them. Where the soil is heavy and sticky the holes should be made with a trowel, as a dibble will consolidate it excessively.

Soil for leeks should be rich, preferably in organic manure, but where the water-table is sufficiently high excellent crops can be grown with artificial fertilisers alone. A complete fertiliser (one containing nitrogen, phosphoric acid, and potash) should be applied and thoroughly incorporated throughout the bed at the rate of 3oz. to 4oz. per square yard.

Varieties include London or Broad Flag, which is best grown for early use; Musselburgh, which is a very hardy variety usually characterised by its long, blanched stem; and Lyon, which is generally similar to London, but grows larger and is slower maturing. Lyon is a good variety for a late crop, as it is slow in running to seed.

All photographs by Green and Hahn.

Incubating Turkey Eggs

THIS article, the second of a series on turkey raising by the Animal Industry Division of the Department of Agriculture, discusses the incubation of turkey eggs. In the October "Journal" advice was given on the selection of turkeys for breeding. No attempt has been made here to describe the principles of incubation in detail; rather has an endeavour been made to select the points likely to be of particular value in the incubation of turkey eggs. For those who have no previous experience of incubation and are taking up turkey raising it is suggested that knowledge should first be acquired from a book on the principles and practice of incubation or from Bulletin 197, "The Theory and Practice of Incubation" (price 6d., post free), issued by the Department of Agriculture.

An incubator room on a turkey farm where a cabinet machine is used for hatching.

TURKEY eggs, like hen eggs, may be hatched by natural incubation under turkey hens or hens of the domestic fowl. Alternatively the eggs may be artificially incubated with either the small flat-top incubators or cabinet machines. Natural incubation may be favoured by the small turkey keeper raising a strictly limited number of birds, but artificial incubation is commonly practised by the commercial turkey raiser. Accordingly a few brief comments only will be made on natural incubation.

Natural Incubation

Where a domestic hen is used care should be taken to select a good broody hen of one of the heavy breeds. The period of incubation is 28 days and for this long period of sitting a hen in good condition and fully broody is necessary. Such a hen may be set in the normal type of setting box (15in. x 15in. x 18in. high) placed directly on the ground to get natural moisture. Care must be taken that the sitting hen is not disturbed or attacked by vermin or animals such as cats and dogs. A hen will cover from 8 to 12 eggs, depending on the size of the eggs. For the day-to-day management of a sitting hen reference may be made to Bulletin 197, "The Theory and Practice of Incubation".

If a turkey hen is used for sitting, a sitting box or coop with minimum measurements of 24in. x 24in. x 30in. high is required. Turkey hens will, of course, cover more eggs and may be given from 15 to 20 eggs to hatch.

Artificial Incubation

Commercial turkey raisers have a choice of flat-top incubators or the more modern cabinet incubators. Generally modern commercial turkey raisers are using cabinet incubators, though there are still those who claim from experience over the years that the flat-top machines are more successful than the cabinet machines for turkey eggs. There are undoubtedly still problems associated with the artificial incubation of turkey eggs which have to be solved, as the results obtained with turkey egg incubation cannot yet compare with the results obtained with hen eggs in the modern cabinet incubator. As with the incubation of hen eggs, it is wise after a make of cabinet machine has been chosen to follow the maker's instructions at the start. These may be varied later as the operator gains experience, having regard to the conditions in the incubator room and in the district. Some comments on the main controlling factors of incubation may be helpful.

Temperature

For cabinet incubators a temperature between 99 and 100 degrees F. is usually recommended. In flat-top machines, with the thermometer just less than 2in. from the floor of the egg tray, temperatures advised are: 1st week, 100.5 degrees F.; 2nd week, 101.5 degrees F.; 3rd week, 102.5 degrees F.; 4th week, 103 degrees F.

A slowly rising temperature over the 28 days is recommended.

Humidity

The maintenance of a correct humidity in the incubator is as important as the maintenance of the right temperature. During incubation turkey eggs lose from 13½ to 14 per cent. of their original weight owing to evaporation of the moisture in the eggs. This is a somewhat greater loss than occurs with hen eggs being incubated. To control the loss of moisture to the required amount the temperatures and humidity recommended for cabinet incubators are as follows:—

	For first 24 days Degrees F.	For last 4 days Degrees F.
Temperature ..	99½	99½
Wet-bulb reading .	87-88	90

Turning

Turning eggs in an incubator is essential and for turkey eggs turning not less than three times daily is strongly recommended. Claims are made that turning five times daily is preferable to three for best results. Turning should be regular up to the 23rd or 24th day; thereafter no turning should be done. Some turkey raisers claim that there is no advantage in turning after the first 3 weeks. In flat-top machines turning four times daily has proved more successful than the usual twice-a-day turning, but always provided the job can be done reasonably quickly to prevent both the eggs and the incubator losing a dangerous amount of heat.

Cooling

It was considered at one time that improved results were obtained by cooling. As this was when flat-top machines were in use, it is highly probable that the "cooling" in effect allowed the eggs additional oxygen which was highly beneficial. The ventilation in flat-top machines is not particularly efficient, especially in hot weather, when there is less difference between the temperature in the incubator and that of the incubator room. Thus if only twice-a-day turn-

HATCHING TURKEY EGGS . . .

ing is practised with flat-top machines, airing the machine and eggs during hot weather for up to 10 minutes can be recommended. No cooling or airing is necessary with the modern cabinet machine, which has efficient ventilation.

Hatching Eggs

For hatching, eggs should be collected as often as circumstances permit from the nests to prevent breakages and dirty eggs. All abnormal eggs, including small eggs, unduly large eggs, eggs with poor shells, misshapen eggs, and cracked eggs should be discarded. Turkey eggs may be held for up to 7 days without appreciable adverse effects on hatching. They should be stored with the large end up, and if possible in a room with a temperature between 50 and 55 degrees F. High temperatures above 60 degrees F. should be avoided, as these are likely to cause germination to start. Temperatures below 40 degrees F. are not desirable, as the germ may be weakened or killed. While being held for hatching turkey eggs should not be exposed to draughts, as excessive moisture can be lost from the eggs. Finally it is not desirable to wash dirty turkey eggs required for hatching; rather should the dirt be scraped off.

The size of eggs will vary to some extent with the breed and strain of birds. For the Mammoth Bronze turkey bred in this country the weight of egg will be between 3oz. and 3½oz., a satisfactory weight for hatching.

Candling

To find infertile eggs or eggs in which the germ or embryo has died the eggs are held before a strong light in a darkened room. If only small or moderate numbers of eggs are being incubated they may be candled twice —once on the 7th to 10th days and later on the 21st to 23rd days, when turning ceases and the eggs are put out on the trays for hatching. Where large numbers of eggs are involved one test on the 21st day is sufficient.

Hatching Day

All turkey eggs do not hatch at the same time. Pipping usually starts on the 26th day and a normal hatch will take up to 36 hours before being completed. The time of hatching will be influenced by the age of the egg when set and its size. The fresher the egg is at setting the earlier it is likely to hatch. Large turkey eggs are later hatching than the moderate or smaller sizes. Some turkey raisers place the larger eggs in a separate tray and place them in the incubator 10 hours earlier than the main batch. There is a tendency for most hatches to have some really late-hatching turkey chicks. Experience has shown that these rarely develop as well as the more normally hatched poults. Though it is true that such poults are unlikely to be selected as breeders when the poults are fully grown, since they are unlikely to be as well grown as the rest, it is wise to ensure that they do not get into a breeding pen. This can easily be done by toe punching such late hatchers before they leave the incubator room.

In general hatchability in turkeys is not high and many turkey raisers fail to get more than 50 to 55 turkey chicks from a setting of 100 eggs of the heavier breeds. Where careful breeding work has been done with strict attention to hatchability in the parent stock this figure can be raised to between 60 to 70 chicks for each 100 eggs set. Turkey chicks, like chicks from hens, hatch out with a sex ratio of approximately 50 : 50 males and females.

As in the incubation of hen eggs, great care should be taken after each hatch to ensure that the hatching trays and incubator are thoroughly cleaned and disinfected.

Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given during December as follows:—

1YZ Rotorua, 7.15 p.m.

8 December—"The Stock Act and the Farmer", by A. G. W. Stevens, Livestock Instructor, Department of Agriculture, Rotorua.

2XA Wanganui, 8 p.m.

1 December—"For the Countrywoman", by Mary MacDonald.

8 December—"The Radio Vet.", by S. Jamieson, Veterinarian, Department of Agriculture, Wanganui.

15 December—"Has Pampas Grass a Place?", by G. R. Moss, Fields Instructor, Department of Agriculture, Wanganui.

2ZA Palmerston North, 12.33 p.m.

5 December—"Some Points in Meat Inspection", by A. Hercus, Meat Inspector, Department of Agriculture, Levin.

12 December—"Grass-grub Damage and Control Measures", by L. W. Blackmore, Instructor in Agriculture, Department of Agriculture, Dannevirke.

19 December—"Sterilisation of Dairy Equipment", by L. P. Cotter, Farm Dairy Instructor, Department of Agriculture, Pahiatua.

26 December—Y.F.C. session.

3YA Christchurch, 12.20 p.m.

5 December—"Accessories to Home Decorating", by Eleanor Couston, Fields Officer in Rural Sociology, Department of Agriculture, Christchurch.

4YZ Invercargill, 7 p.m.

6 December—"Glasshouse Tomatoes", by C. N. Paulin, Horticultural Instructor, Department of Agriculture, Invercargill. "Dairying and Cheese Manufacture", by G. E. Hicks, Dairy Instructor, Department of Agriculture, Invercargill.

13 December—"Nectar", by S. Line, Apiary Instructor, Department of Agriculture, Invercargill. "Dairying and Cheese Manufacture", by G. E. Hicks.

20 December—"Dairying and Cheese Manufacture", by G. E. Hicks.

Regular Sessions

1XH Hamilton, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8.5 p.m., Wednesdays at 8.1 p.m. (Northland stock market report), Fridays at 8.1 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m. (Pig Council talk on fourth Wednesday of every other month), Thursdays at 12.33 p.m. and 7.15 p.m. (fortnightly).

2XA Wanganui, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Mondays and Thursdays at 12.33 p.m.

4YA Dunedin, Mondays at 12.33 p.m., Wednesdays at 7 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 7 p.m.

Vaccination against Contagious Abortion

APPLICATIONS by farmers for vaccination of their calves against contagious abortion in 1956 are now due. The charge is 2s. per calf irrespective of the number involved. The closing date for applications for dairy calves is 14 January and for beef calves 31 July. A late fee of 10s. will be payable on any application received after these dates.

As in previous years members of veterinary clubs should apply to the secretary of their club, and other farmers should apply to their nearest Livestock Instructor or private veterinary surgeon. Applications to Livestock Instructors must be accompanied by a cash payment calculated on the basis of the charge mentioned.

It is desirable that applications should be sent in as early as possible so that vaccinating officers can arrange the work efficiently. Farmers are therefore requested to forward their applications by 4 January. Application forms can be obtained from any Livestock Instructor.

Securing Increase in Hive Numbers

Seasonal Notes for the Domestic Beekeeper

THE most common method domestic beekeepers use to secure increase in hive numbers is the hiving of a swarm from the original colony. Though allowing a colony to swarm for the sake of increase will certainly produce a new colony, neither the swarm nor its parent colony is likely to produce a payable crop of honey in the same season. In this article D. Roberts, Apiary Instructor, Department of Agriculture, Auckland, describes methods of making increase without the serious loss of production attendant on swarming.

Upper—Preparing a strong colony for division. Lower—The divisions completed. Lower photograph by Rendell's.

WHEN a swarm issues from a bee colony it takes with it in addition to young bees and the queen a great proportion of the field bees. The colony is thus so divided that the force of bees in each part is not sufficient to gather a surplus crop of honey unless the swarm issues early in the season.

In addition to the division of the working force the parent colony is left without a laying queen for a period and consequently cannot continue immediately to produce young worker bees until a new queen has emerged and mated. This may involve a break of 3 weeks or more in egg laying in the colony. While there is no continual production of young bees to replace the daily loss of field bees colony strength will decrease rapidly.

The swarm, too, loses strength rapidly because most of the bees composing it are mature workers with only a limited life span. In addition the swarm, though accompanied by a laying queen, must devote all its energies to the establishment of the new home. The queen with the swarm will begin to lay immediately there are cells available for eggs, but it will be 3 weeks before the first worker eggs will produce adult bees and a further fortnight before these workers become available to undertake field duties. Though a swarm may appear to be of very great strength and presumably able to gather honey in quantity, during the first few weeks of its existence as a single colony there is a constant diminution of its strength.

Importance of Colony Strength

A colony maintained at good strength and which is not allowed to swarm may produce 100lb. or more of surplus honey in a season. The same colony if allowed to divide by swarming will be unlikely to produce any surplus at all. Colony strength is a most important factor in the obtaining of good honey crops, and strength must be well maintained throughout the honey flow if payable crops are to be harvested. A colony of 30,000 bees may produce perhaps 20lb. of surplus honey, but in similar conditions another colony of double the number of bees will produce not, as may be thought, double the quantity of honey, but four or more times the amount. Methods of increase which seriously decrease the working strength of a colony must affect the surplus honey it can gather and if increase and payable crops are desired, methods of increase least affecting the colony's strength must be adopted.

When a colony has reached its peak of population before the main honey flow combs of brood and some bees from it can generally be removed without seriously impairing the colony's strength and honey-gathering capacity. These combs of brood and bees can be used, with the addition of a young laying queen, to form a nucleus which will build up to a colony of a size great enough to ensure a bee strength sufficient for the gathering of stores of honey and pollen for safe wintering.

In most parts of New Zealand the occurrence of early nectar flows and a relatively mild climate enable vigorous, healthy bee colonies to reach great strength before the main flow begins. Colonies reaching the peak before the main flow often develop the swarming impulse, and unless control is strict, a swarm will issue. The removal of some combs of hatching brood and a portion of the bees at this time together with the replacement of the combs with frames of foundation is of considerable assistance in controlling the tendency to swarm.

Making a Nucleus

The removal of some brood and bees at this period will, if carried out correctly, serve the double purpose of assisting in swarm control and providing increase.

To make a nucleus in this manner the colony to be divided should first be inspected for traces of disease. If the colony is free of infection, the queen should be located and the comb on which she is found placed to one side in a spare super. Two combs of **hatching brood** with the adhering bees are then taken and placed in a nucleus box, which is simply a narrow super holding 4 to 5 full-sized brood frames. If a nucleus box is not available, a suitable substitute can be made from an ordinary hive super by fixing a dividing board lengthwise in the middle. Enough bees are then shaken into the nucleus from the other frames of the hive to ensure that sufficient are there to care for the brood. Besides the combs of brood and the bees a full comb of honey and a comb containing pollen must be given. The nucleus is then closed down, the entrance blocked with green grass, and the nucleus stood in a shady place. The purpose of the grass is to prevent egress of the bees for a period without preventing ventilation.

If the nucleus is formed and left with an open entrance, most of the bees will return to the parent hive

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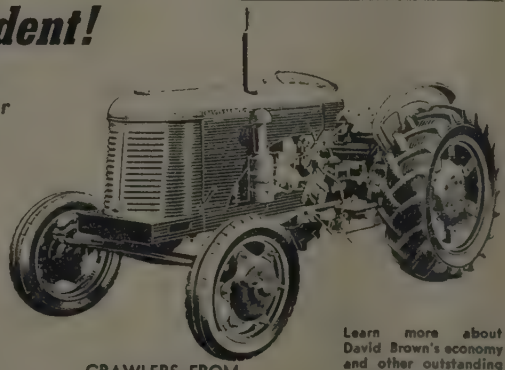

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and the nucleus will be of no value. The grass should not be jammed in place so that force is needed to remove it, but should be just so tight that when it dries out the bees can remove it and find egress.

Immediately the nucleus has been formed the queen is replaced in the parent colony, the vacant spaces left by the removal of the combs are filled with frames fitted with foundation, and the hive is closed down. Though blocking the entrance with grass will confine the bees to the nucleus for up to 48 hours, there will still be some drift back to the parent hive when the bees are released. Consequently more bees than are necessary should be given initially to compensate for this loss.

The making of a nucleus for increase should always be carried out near midday and the weather should be fine and warm. In these conditions the bulk of the older bees will be absent from the parent colony and the bees taken for the nucleus will be mostly young. This is important, as young bees are not as liable to return to the parent colony when released and will accept a new queen much more readily than the older field bees.

Providing Nucleus with Young Queen

When the nucleus has been formed the next step is to provide it with a young queen. If a nucleus is provided with eggs or larvae of the right age, it will often raise a queen for itself. This is not good practice, for the bees of the nucleus are not in a position to raise queens of good quality and any produced will be unlikely to be satisfactory. A nucleus left to raise its own queen will be without a laying queen for at least 3 to 4 weeks and its progress will be greatly hampered in this period. The nucleus should be given either a queen cell about to hatch or a young laying queen.

For beginners with little or no experience of queen rearing the provision of a young laying queen is by far the most satisfactory method. The introduction of a new queen after the formation of the nucleus ensures that the new colony will progress to the best advantage and, if the queen is obtained from a recognised breeder, that the bees will be of a good strain. If the new queen is not available until a few days after the formation of the nucleus, the combs must be examined before she is introduced and any queen cells there destroyed.

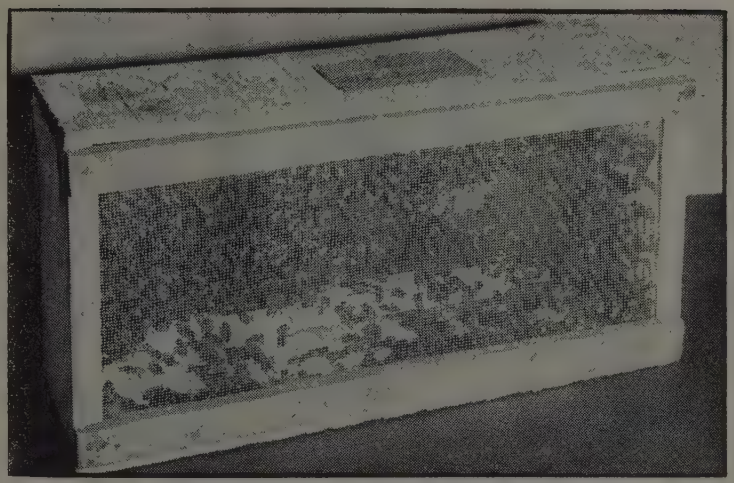
Requirements necessary for the success of this method are:—

The parent colony must be strong and healthy.

The bees of the nucleus must largely be young ones.

The nucleus must be provided with sufficient honey and pollen.

A young queen or a ripe queen cell must be given.



[*Sparrow*

A 3lb. package of bees with queen.

The parent colony must not be robbed of bees to the extent that its ability to gather a good honey crop is seriously impaired.

Simple Division of a Colony

Increase by the simple division of a strong colony into two equal parts can generally be satisfactorily made **provided it is carried out not less than 6 weeks before the beginning of the main honey flow.** Again it must be stressed that colonies selected for division need to be strong in bees, with vigorous, healthy queens. Weak colonies or those with a failing queen will not make successful divisions.

After the colony has been checked over for health and vigour it is divided in the following manner. Most of the combs of **sealed brood**, the queen, and about two-thirds of the bees are placed in a new hive and moved to another location. The hive on the original stand is thus left with mostly unsealed brood and a third of the bees. It must be given a young laying queen or a ripe queen cell. The introduction of a laying queen is preferable, because this will ensure that there is only a minimum of interruption of egg laying.

In 24 hours many of the field bees from the portion on the new location will have returned to the original site, making both colonies more or less equal. The colony on the new location, having most of the sealed and emerging brood and the old queen, will gain strength more rapidly than the portion on the original stand, but provided each is supplied with ample stores of honey and pollen, progress of both should be sufficient to ensure a payable crop.

It should be understood that both the methods described are intended for application where the beekeeper has only the one apiary site available. If another site not less than 2 miles away is available, the precautions against the drifting of the bees from nuclei or divisions back to the parent hive are not necessary. In such case the nucleus or division is moved to the distant apiary on formation.

Whatever method is used, the nuclei or divisions must not be subject to robbing by neighbouring bees. Supers and lids used for this purpose should always be bee-tight and the entrance reduced so that they can be easily defended. An entrance 2in. long by $\frac{3}{8}$in. deep is generally ample for a 4-frame nucleus, and a division occupying a full super should not be given an opening more than 6in. by $\frac{3}{4}$in. Divisions should not be made when robbing is prevalent and should be closely watched at all times until they have gained sufficient strength to provide adequate defence.

Use of Package Bees

With the development of a trade in package bees those beekeepers not wishing to make divisions can secure increase by purchasing packages for their requirements. The package bee trade in New Zealand is centred on North Auckland, where colonies develop to great strength early in the season.

Packages are normally dispatched in wood and wire-mesh cages into which are shaken 2lb. or 3lb. of young worker bees as required. Each package is provided with a supply of queen cage candy to keep the bees fed in transit. A young laying queen and some escort bees in an introducing

Installing package bees. Left—The top removed from a package to show bees clustered on candy. Right—Bees established on combs in a hive 2 days after being installed.

cage are attached to the inner side of the lid. A 3lb. package will contain some 15,000 bees and a young queen, sufficient to establish a colony capable of rapid development.

Where it is desired to obtain a crop from the package in the season of establishment it is necessary to arrange for delivery not less than 8 weeks before the beginning of the main honey flow. If increase only is the aim, delivery at the beginning of the main flow will be quite suitable.

Installing Package Bees

The best time to hive package bees is in the late afternoon or early evening. Bees hived at this time are not as inclined to fly out of the hive and will tend to become established overnight. Cool, cloudy weather with little wind is the most suitable for this operation. Unless the time and weather are suitable on arrival, the package should be stored in a cool, dark place until the evening. Packages must not be exposed to bright, warm sunshine for more than a few minutes; if they are, the bees will become overheated and soon die. Because of this arrangements must be made for immediate collection of packages on their arrival at the terminal airport, port, or railway station.

The bees are usually dispatched by air freight, and delivery to the terminal airport is under controlled conditions. It is from this point that the buyer must arrange for proper care. If the beekeeper cannot collect the package himself, the person making final delivery should be instructed that the package must not be exposed to heat or sunshine and must be allowed free ventilation. Suppliers advise by telegram the date of dispatch and the flight by which the bees are being sent.

When notice has been received that the package has been dispatched a hive should be prepared so that the bees can be installed immediately conditions are suitable. A hive is prepared by setting a super of drawn combs or frames of foundation on the bottom board and if possible including at least one frame of honey and pollen. On this another empty super is placed; drawn combs are preferable for this purpose. The entrance should be reduced to a space of about 1in. by ⅜in. by a block of wood. The space of 1in. by ⅜in. is then lightly blocked with green grass.

To install the bees the nails holding the lid of the package should be partly withdrawn so that the lid is only lightly held. The bees are then shaken down to the bottom of the package, the lid with the queen cage attached is removed, and the queen cage is unfastened. The lid is slid back over the package while the queen is inspected to see that she is still healthy and vigorous.

Generally a piece of perforated metal is fastened over the candy-filled hole on the end of the introducing cage. This must be removed together with the piece of cardboard underneath. If there is only very little candy left in the hole, the cardboard should be left in place. The cage with the queen is then placed between two of the frames, the bees again shaken down to the bottom of the package, the lid removed, and the package inverted over the frames where the queen cage has been placed. The hive is then closed down, care being taken to see that there are no cracks or crevices where robbers could enter.

If only one super is available, only five frames or combs are used, thus leaving a space to one side. The procedure is as with the previous method to the point where the queen cage is placed between the frames. Then a portion of the bees in the package is shaken on frames where the queen cage is placed and the package with the lid removed is stood upright alongside in the space provided by the removal of frames. The bees will quickly find their way from the open package to the queen.

Package bees will not make progress unless there is a honey flow in progress when they are established. If there is no flow at the time, the bees must be fed with combs of honey or sugar syrup. Indeed it is of advantage to provide sugar syrup at all times when hiving packages. In the first method of installation described above sugar syrup can be simply supplied by the use of a 5lb. honey tin as a feeder. This can be stood alongside the package in the upper super. In the second method a division board feeder will be more convenient.

Pollen is essential to the progress of brood rearing, and if ample supplies are not available at the time, the bees must be given a comb of pollen from another hive or supplied with a cake of pollen substitute.

If there is undue delay in transit and large numbers of the bees appear to be dead or dying on arrival, they should be fed immediately with a syrup mixed from equal parts of white sugar and water. This is brushed on to the wire gauze of the packages, which are stored in a cool, dark place. Where air transport is used this contingency is not likely to arise unless there has been undue delay in collection of the package from the terminal airport.

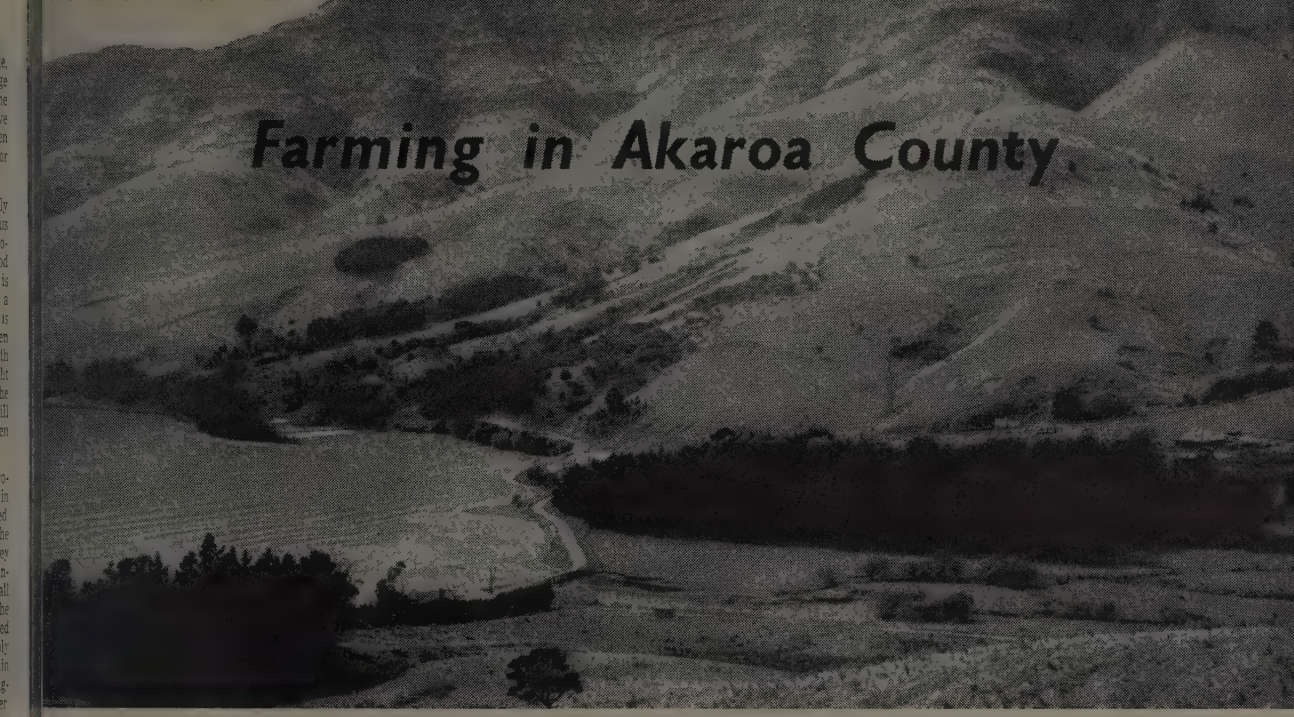
Poultry Keepers' Course of Instruction

A COURSE of instruction for both commercial and household poultry keepers will be held at Massey Agricultural College on 7, 8, and 9 February.

Copies of the programme of the course will be supplied on request by secretaries of poultry clubs, the Registrar of Massey College, Private Bag, Palmerston North, or the Secretary, New Zealand Poultry Board, P.O. Box 379, Wellington.

A similar course of instruction will be held at Canterbury Agricultural College, Lincoln, on 8, 9, and 10 May.

Farming in Akaroa County



"OVER the past 100 years Banks Peninsula has been farmed on the strength of its original fertility. It is now becoming apparent that a slow decline in the natural productivity of the soil is occurring. This tendency can be counteracted only by increased use of fertilisers and lime and by improved management. Much country the topdressing of which had been regarded as impracticable is capable of considerable improvement now that facilities such as aerial topdressing or blower type topdressers are available." This was an observation made by P. R. Barrer and D. L. Johns on the results of topdressing trials on Banks Peninsula reported in an article in the "Journal of Agriculture" for September 1954. To obtain some information on land utilisation and farm management practices being adopted by farmers in this region a farm management survey was made of Akaroa County during the 1953-54 season by the Economics Section of the Department of Agriculture at Christchurch, and in this article R. C. Stuart, Agricultural Economist, and H. H. Tocker, Research Officer in Farm Management, set out the results of the survey.

INFORMATION on land use and farm and stock management practices was obtained from 83 farmers in the county, the area of the farms comprising 53,200 acres, which is 54 per cent. of the county area of 99,000 acres.

Akaroa County occupies the eastern half of Banks Peninsula and like the remainder of the peninsula comprises hill country most of which is steep, some areas rising to over 2000ft., with the highest peak over 2700ft. The topography has made access to many parts difficult, with consequent high freight charges.

The annual rainfall on the southern hill slopes of the county is approximately 25in. and on the hill tops it is over 50in. The Borough of Akaroa on Akaroa Harbour has an average annual rainfall of 44.3in. The effect of aspect and altitude on temperatures is quite considerable. At the high altitudes pastures on the sunny slopes have a fairly long growing season, but those on the shady faces exposed to the southerly winds have a shorter season.

The soils of Banks Peninsula are derived from two main parent materials, volcanic ash and loess. The lower, easier slopes carry the greater thickness of loess over the original mass of volcanic rock, but with the increasing steepness the loess tends to thin out near the hill tops. The two groups are readily distinguished, the volcanic ash soils being brown or chocolate and the loess soils having yellow subsoils.

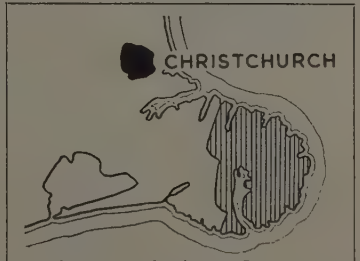
▲ The soils of Banks Peninsula are derived from two main parent materials, volcanic ash and loess. This view shows the loess-covered lower slopes at Pigeon Bay rising to a volcanic escarpment.

Land Utilisation

Of the total area of 53,195 acres on the surveyed farms, 91 per cent. can be termed as effective farming land. The remaining 9 per cent. consists of land taken up by buildings, yards, plantations, native bush, and waste land, that is, areas comprising rocky outcrops and steep-sided gullies.

TABLE 1—EFFECTIVE FARMING LAND ON SURVEYED FARMS

Size group	No. of farms	Total area	Occupied by buildings, plantations, bush, etc.	Effective area	
Acres		Acres	Acres	Acres	Per cent.
Under 250	20	3,435	383	3,052	89
250 and under 500	26	9,452	857	8,595	91
500 and under 1,000	22	16,753	1,550	15,203	91
1,000 and over	15	23,555	1,958	21,597	92
	83	53,195	4,748	48,447	91



Location of Akaroa County.

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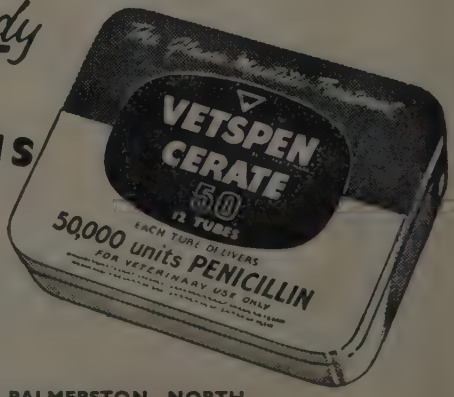

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Of the effective farming area of 48,447 acres, 89 per cent. was in clear pasture, 4 per cent. was lightly reverted, and 7 per cent. moderately reverted.

Clear Pasture

The clear pastures varied in composition from farm to farm, but in general they were crested dogstail-cocksfoot dominant swards with some white clover and ryegrass, and many had sweet vernal, browntop, danthonia, Yorkshire fog, and hairgrass. The pastures were inspected late in February and early March after a dry period and this apparently accounted for the lack of clovers and the relative importance of crested dogstail in the swards.

The better pastures were usually found on the flats where generally topdressing had been carried out, while on the drier and more exposed areas they were poor.

Throughout the county weed infestation was of considerable significance with thistles, bidi-bidi, rushes, docks, and flat weeds most prominent, and with some hawthorn and sweet brier.

Lightly Reverted Areas

The lightly reverted areas, comprising 4 per cent. of the effective farming area, carried small areas of scattered, light native scrub, fern, gorse, and broom. Some farms have effectively controlled this reversion by increasing cattle numbers and at present there is no serious problem, though there is a tendency for these areas to increase.

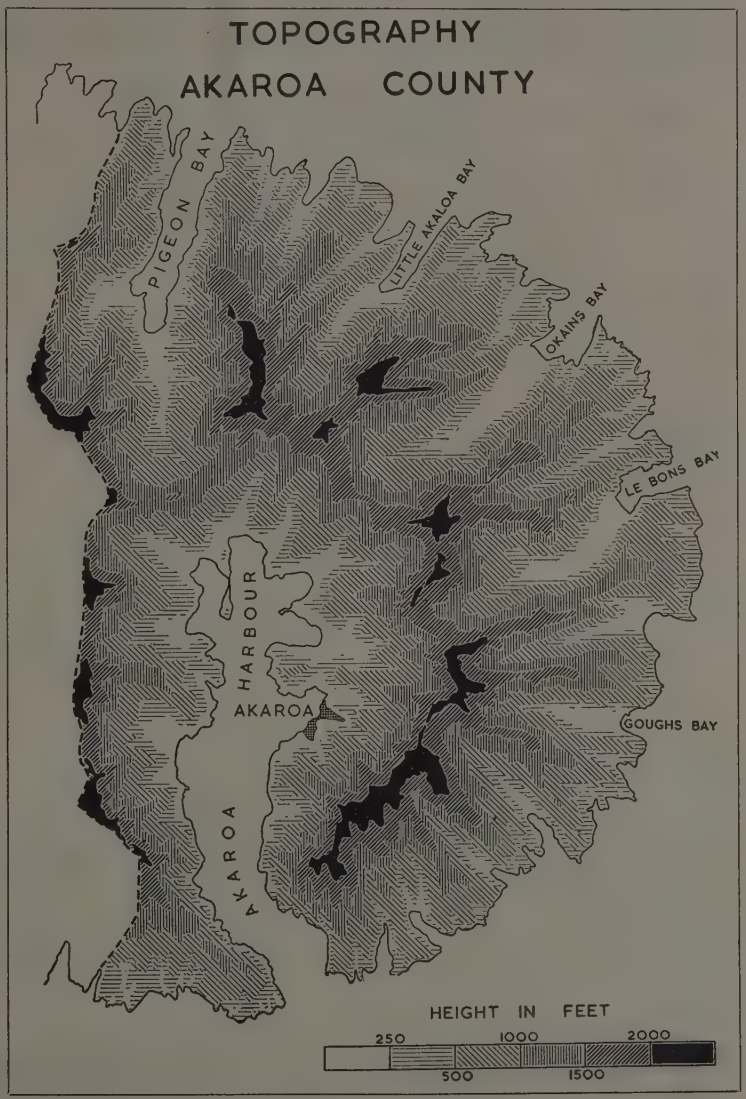
Moderately Reverted Areas

The areas moderately reverted were covered with fairly heavy native scrub, gorse, broom, and fern, which restricted effective grazing to approximately one-third of this type of country. Much of it is fairly steep and opinions varied as to the economy and wisdom of clearing the heavy scrub. The economic factor was largely governed by the cost and shortage of labour, and it was contended that removal of this cover would invite erosion as well as destroy shelter from sun and storm.

Fern invasion continues unchecked and bidi-bidi is spreading on many holdings, especially on the small fat lamb holdings where few if any cattle are run.

On the assumption that the survey sample is reasonably representative of the 98,000 acres occupied for farming in Akaroa County, with 9000 acres occupied by buildings, plantations, and heavy bush, there is left 89,000 acres divided into 10,000 acres of lightly or moderately reverted pasture and 79,000 acres of clear pasture.

The reversion problem is due partly to labour shortage and the lack of pasture maintenance by topdressing and oversowing in association with a low cattle : sheep ratio. The emphasis on sheep over the past 30 years has no doubt helped to eliminate cocksfoot from the sward and allowed the entry of low-producing species, and the position has been aggravated by attempts to carry the same number of sheep on reduced areas of pasture.



Topdressing

Though good responses are obtained from topdressing with phosphatic fertilisers on the peninsula, Table 2 shows that relatively little topdressing is done.

TABLE 2—AREA TOPDRESSED ON SURVEYED FARMS IN 1953-54

Size group (Acres)	No. of farms	Total area (Acres)	Area topdressed with Superphosphate and basic slag: Area (Acres)	Superphosphate and basic slag: Per cent. of total area	Lime: Area (Acres)	Lime: Per cent. of total area
Under 250	20	3,435	467	13.6	136	4.0
250 and under 500	26	9,452	407	4.3	227	2.4
500 and under 1,000	22	16,753	960	5.7	372	2.2
1,000 and over	15	23,555	484	2.1	325	1.4
	83	53,195	2,318	4.4	1,060	2.0

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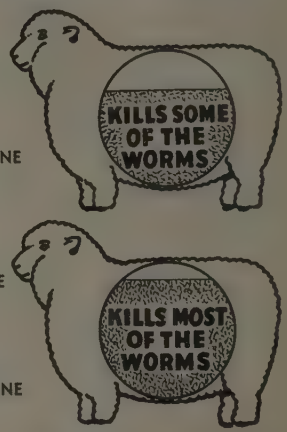

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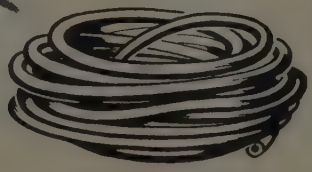

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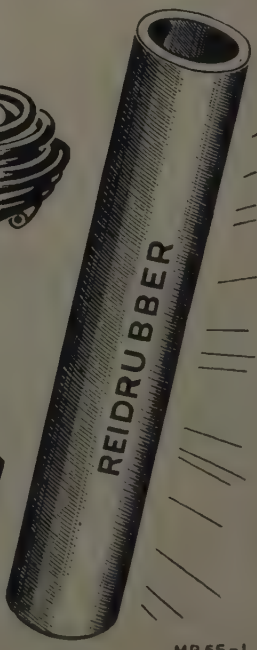

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TABLE 3—AVERAGE NUMBER OF STOCK CARRIED PER FARM IN FOUR FARM SIZE GROUPS IN 1953-54 SEASON

Size group Acres	No. of farms	Average area Acres	Average number of stock: Dairy cows	Sheep	Beef cattle	Ewe equivalents per acre
Under 250	20	172	37	77	4	1.9
250 and under 500	26	364	18	537	26	2.1
500 and under 1,000	22	762	16	973	108	1.8
1,000 and over	15	1,570	10	1,791	239	1.7
Average	83	641	21	768	81	1.8

Though only 50 of the 83 farmers visited had done any topdressing, there now appears to be a greater appreciation of the value of the use of phosphatic fertilisers and this is evident from the number of airstrips that have recently been constructed on the peninsula for aerial topdressing. The use of aircraft for spreading fertiliser may be a big factor toward increasing production from the area.

Farming Systems

Climate, topography, and soils combine in Akaroa County to make farming chiefly pastoral, with dairying, fat lamb production, and beef cattle rearing and fattening associated with the running of store sheep and wool growing the principal systems practised. The intensive systems of farming are found in the valleys and higher-rainfall areas and the more extensive systems in the lower-rainfall areas such as in the eastern bays.

Dairying

Dairying is the oldest system of farming in the county and has persisted in such areas as Okains Bay, Pigeon Bay, Little Akaloa, Barrys Bay, Takamatua, and Akaroa. The decline in the importance of dairying is attributed to the period when sheep numbers increased rapidly with the decrease in the area saved for cocksfoot seed. Many of the dairy farms were small holdings which became badly poached by cattle during winter. The dairy herds were run on this land during the milking season only and were wintered on the hills of some farms where cocksfoot seed had been harvested. When the demand fell for cocksfoot seed most farmers increased sheep numbers, with the result that the areas normally leased for winter grazing of dairy herds were no longer available. The dairy farms were too small to provide both winter and summer grazing for dairy stock, and aggregation of holdings followed.

Though dairying is common to all groups, only 12 of the 83 farms were engaged solely in dairying and a further 32 were mixed dairy and fat lamb farms. The smallest acreage group had an average of 37 cows producing 2371b. of butterfat per cow off 172 acres and represented the chief dairying section. In the largest acreage group dairying was of only minor importance.

The herds were predominantly Friesian and Friesian cross and were milked mainly for cheese production, though a few herds supplied whole milk for the Christchurch city supply.

Pig meat production associated with dairying was not of any great importance, but was done on a few farms. In the main, production of store pigs for sale at the Addington stock market was the objective.

Sheep and Cattle Farming

After the decline in dairying and the cocksfoot seed industry, sheep and later cattle played a more dominant role in peninsula farming. Table 3 shows that sheep and cattle production was the feature of the farms over 250 acres. The per acre carrying capacity in all groups was fairly low, though for the farms over 1000 acres this was not surprising, since much of the land was held in large blocks in regions of low rainfall.

Seed production in any of the groups was negligible as may be gauged from the fact that cocksfoot seed was harvested in Akaroa County in 1952 from only 661 acres, compared with the 10,000 acres or more (10,082 acres in 1920-21) harvested annually when cocksfoot seed production in the county was at its peak.

Stock Management

Sheep

The breeding ewes were predominantly Romney and were mated to Romney rams for replacements and the surplus sold as stores. For fat lamb production Southdowns, Border Leicesters, Suffolks, and various Down breeds were used. The smaller farms tended to buy in replacements and the larger units bred their own. Several of the larger farms held ewe lambs and sold any surplus not required for replacements as 2-tooth ewes at the annual Little River ewe fair.

Ewes were wintered mainly on saved grass without supplements. The ewe hoggets usually received preferential treatment; they were fed on the best pastures and occasionally received some hay. Shearing took place in December with some pre-natal shearing in August.

Ewes were culled mainly at 4 years old and sold at the Little River ewe fair for fat lamb production on the Canterbury Plains or to the smaller holdings on the peninsula. Lambing was spread from mid-August to late September and the lambing percentage varied greatly, ranging from 75 to 150 with an average of 107.

Throughout the county weed infestation was of considerable significance, with thistles, bidi-bidi, rushes, docks, and flat weeds most prominent.

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JA6

Of the effective farming area in Akaroa County it was estimated that 89 per cent. was in clear pasture, 4 per cent. was lightly reverted, and 7 per cent. was moderately reverted. The illustration shows reversion to scrub and fern on hill slopes.

TABLE 4—FAT LAMB PRODUCTION

Size group	Per cent. lambs tailed	Per cent. lambs sold fat	Average fat weight of lambs	Per cent. lambs sold as store	Per cent. ewe lambs retained
Acres			lb.		
1. Under 250	111	80	35.5	10	4
2. 250 and under 500 ..	111	73	34.2	12	12
3. 500 and under 1,000	104	55	34.6	17	21
4. Over 1,000	101	41	34.5	21	35
Average	107	55	34.5	17	24

Fat Lamb Production

Table 4 shows fat lamb production. The farms in groups 1 and 2 sold 80 per cent. and 73 per cent. respectively of the lambs tailed as fat at the average weights of 35.5lb. and 34.2lb. respectively. Only 55 per cent. and 41 per cent. of the lambs tailed in groups 3 and 4 respectively were sold as fat and 17 per cent. and 21 per cent. respectively were sold as stores.

It was apparent that many farmers were disturbed at the decreasing percentage of fat lambs being drafted. Though the greater proportion of the store lambs sold were Romneys, which do not fatten so readily, there are two features of peninsula farm management which appear to have a bearing on fat lamb production:—

1. Weaning was generally delayed until late February, good grass being wasted on ewes producing only token quantities of milk. With earlier weaning it should be possible to draft lambs on to spelled pasture with a consequent increase in numbers drafted fat at higher weights.

2. With an emphasis on the fattening of cattle, the function of cattle to control fern, light scrub, and roughage is often only a secondary consideration, with a consequent adverse effect on sheep and fat lamb production. The cattle are usually run on their own on the best available pastures.

Beef Cattle

The fattening of cattle is encouraged by the favourable location of Akaroa farms near the Christchurch market. This does not minimise the important part played by cattle in the economy of peninsula farming, but it has placed undue emphasis on the fattening side of cattle management at the expense of fat lamb production and fern and scrub control. Lack of good fences and the work involved in running store cattle plus sheep in addition to other factors make the fattening of cattle quite attractive.

The Aberdeen Angus breed is favoured, though there are also many Hereford, Shorthorn, and various cross-breed cattle carried. About one-third of the farmers breed their own replacements, but cattle are generally bought in as calves or at 18 months old and fattened.

TABLE 5—CATTLE NUMBERS ON SURVEYED FARMS

Size group	No. of farms	No. of farms Fattening cattle	No. of farms Breeding	Cows	Total cattle Fattening	Total cattle carried Other	Total	Cattle per 100 sheep*
Acres								
Under 250	20	7	1	12	67	—	79	70
250 and under 500 ..	26	18	6	104	520	41	665	9.7
500 and under 1,000	22	21	13	393	1,448	543	2,384	13.2
Over 1,000	15	13	8	553	1,208	1,826	3,587	14.1
	83	59	28	1,062	3,243	2,410	6,715	14.1

* Includes dairy cows.

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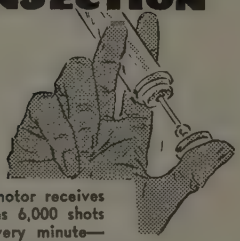

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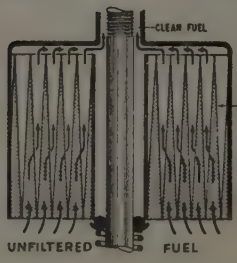

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Intensive systems of farming such as dairying are found in the valleys and higher-rainfall areas. The illustration shows the Barrys Bay region, which is predominantly a dairying area.

TABLE 6—LABOUR EMPLOYED ON SURVEYED FARMS

	Size group (acres)			
	Under 250	250 and under 500	500 and under 1,000	Over 1,000
Number of farms	20	26	22	15
Average size (acres)	172	363	762	1,570
Number employed	12	19	24	26

Several farmers specialise in fattening beef cattle with sheep as a sideline, but where cattle are used for the control of pastures and checking the invasion of scrub and fern cocksfoot pastures are regenerating and reversion is no problem. For the 83 farms surveyed there was an inverse correlation between the degree of infestation and the total cattle run, though this is not conclusive, as the assessment of infestation was an estimate made after each property was viewed.

Labour

From the farmers' viewpoint the shortage of labour is the chief limiting factor to increased production. There has been the usual drift of young men to the towns and the position is further aggravated because many of the present owners are past the age of greatest individual effort. Many of these farmers are at present enjoying a reasonable standard of living and there is no financial pressure either to increase carrying capacity or to take steps to combat the general deterioration of their pastures.

TABLE 7—RANGE OF PRODUCTION OF LAMB MEAT AND WOOL PER ACRE FOR FARMS IN FOUR SIZE GROUPS

Size group	Fat lamb meat per acre	Wool per acre
Acres	Lb.	Lb.
Under 250 ..	11.5-43.0	5.0-16.2
250 and under 500	12.6-61.5	11.6-22.3
500 and under 1,000	8.9-47.1	9.4-19.1
Over 1,000	1.1-26.7	4.5-13.0

The numbers in Table 6 may appear adequate for purely pastoral farming, but much of the labour is of an itinerant nature. The shortage of suitable accommodation so aggravates the position that much of the labour can be regarded almost as casual.

TABLE 8—POTENTIAL PRODUCTION OF AKAROA COUNTY

	Dairy cows	Ewes	Beef cattle	Butterfat Per cow	Butterfat Total	Lamb meat Per acre	Lamb meat Total	Wool Per acre	Wool Total
				Lb.	Tons	Lb.	Tons	Lb.	Bales
Present	4,870	84,579	12,929	221	480	18	723	11.5	2,957
Potential	5,698	126,868	18,100	271	689	33	1,325	16.1	4,140
Increase	828	42,289	5,171	50	209	15	602	4.6	1,183
Increase per cent. ..	17	50	40	22.5	43	83		40	

To attract and keep good labour new houses are a necessity, as much of the present accommodation is obsolete. However, the hilly country and the long hauls make freight charges high, and the cost of a moderately sized house built with the help of a farmer is likely to be approximately £3500.

With cars and trucks and good all-weather roads the usual social facilities of country life are readily accessible. Every bay is connected with the telephone and most houses are supplied with electricity.

Production and Potential Production

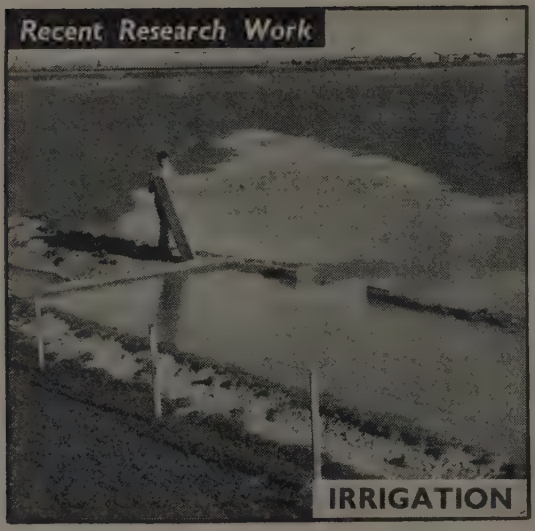
A feature of the per acre production from the farms is the wide range, particularly in lamb meat and wool. Farms where butterfat forms a large part of the total farm output have been excluded from Table 7.

Though the differences can be partly attributed to variations of topography, climate, and soils between farms, a major factor is the variation in management.

An assessment of potential production in Table 8 has been made on the basis of the production being obtained by the highest-producing farms. Though these farms may not be the most efficient in that production costs may be high, they give some idea of the possibilities of the district.

The potential production is considered to be conservative, because the highest-producing farms, on which the estimates have been based, could increase their output.

Banks Peninsula, in spite of being an area of good hill country, has shown a decline in production over the past 10 to 15 years. There has been reversion to gorse, broom, and fern, with no definite policy of checking the reversion or of maintaining pastures by oversowing and topdressing, which appear to be the main keys to increasing production. With the keen interest that is now being taken by a number of peninsula farmers in aerial topdressing there is every possibility of the downward trend in production being arrested and of there being a new outlook on farming in the region.



THE effect of irrigation on the temperature of soil has been studied for the past four seasons at the Department of Agriculture's Winchmore Irrigation Research Station to test the theory that the application of irrigation water, particularly early in spring, would cause a sudden lowering of the temperature of the soil, resulting in a check in pasture growth. Measurements taken during 35 irrigations over the four seasons, however, have shown that usually the reverse is the case; that is, the application of irrigation water generally produces a temporary but definite rise in soil temperature. This is so even early in the irrigating season.

RESULTS OF TRIALS

OF the 35 irrigations studied three had no effect on the soil temperature, five produced a drop in temperature ranging from 0.5 degrees to 2.0 degrees F. and averaging 1.1 degrees F., and 28 resulted in a rise ranging from 0.5 degrees to 8.5 degrees F. and averaging 4.5 degrees F. All these figures relate to measurements made at a depth of 4in. This rise in soil temperature may result in a slight increase in pasture production, but in view of the fact that the effect is short lived and also that the soil temperatures during the irrigation seasons are already fairly high this is not considered likely.

Generally, however, the main effect of irrigation on soil temperature in a dry season is a direct consequence of the better pasture cover. This cover acts as an insulating layer and means that the soil beneath irrigated pasture does not become as hot during the day or as cool at night as does that beneath a "dry" pasture. For example, measurements taken between 2 p.m. and 3 p.m. on 20 January 1955 during a fairly prolonged dry spell showed that the temperature at 4in. depth reached 78.7 degrees F. under non-irrigated pasture and 73.4 degrees F. under irrigated pasture. Temperatures taken at the same time in the top ½in. of soil showed this difference to a greater extent. The temperature at this depth reached 99.8 degrees F. under "dry" pasture and 80.3 degrees F. under irrigated pasture. It is possible that the high temperatures reached under a non-irrigated pasture may have a detrimental effect on growth.

—D. S. RICKARD

HEADING PHOTOGRAPH: A border diked pasture being irrigated at Winchmore Irrigation Research Station.

CHICORY

CHICORY has been used as a crop plant for centuries, but its place in our present farming system has yet to be properly determined. It is a biennial plant from south-west Europe and its value is attributed to its deep-rooting nature, with which can be associated its high mineral and dry matter content, its ability to withstand drought, and its succulence. The leaves remain green and succulent long after most grasses have become dried up. The worth of chicory to the farmer is directly derived from these characteristics.

In England chicory is sown most commonly in herb mixtures and is used for sheep folding, soiling, cattle grazing, and hay. It has, however, been recorded as unsuitable for a hay crop, as it is generally difficult to win the hay in the first place and the succulence of the plant leads to dustiness in old hay. Davies (1952) states that during late autumn and winter in pastures where *Agrostis* and fescue predominate tests have shown that the leaves of chicory, daisy, catsear, and ribgrass provide the most palatable part of the diet offering. Chicory can survive for several years and because of its deep-rooting nature is often used in long-duration leys, but first it must be successfully established, and during the establishment period stock should not be allowed to eat it out or pull it up. Once established it can hold its own.

Information on chicory in New Zealand is meagre. Cockayne (1915) comments that "although chicory is often included in grass-seed mixtures it is doubtful whether its addition is desirable. Certainly the herbage is eaten by stock, but the amount produced is small and the plant soon runs to seed. One of the reasons why the use of chicory has been advised is the deeply rooting nature of the plant. In this respect, however, it is not much different to catsear and it is hard to understand where any real value comes in. Chicory, in my opinion, should be classed in the same category as catsear, and if it is correct that the former is a valuable pasture plant, then our estimate of the latter would have to be modified. It is true that the herbage of chicory is more relished than that of catsear, but the amount produced under ordinary pasture conditions is too small to have much effect on the productivity of the pasture."

NEW ZEALAND TRIALS

Fifteen trials using chicory, most of them laid down between 1948 and 1950, do not clearly demonstrate the value of this plant. Three of the trials show that it appears palatable to stock, recovers well after grazing, is able to withstand drought, and provides feed in the dry period. The impression gained from the other 12 trials is that it establishes well, though slowly, but does not last for any length of time in the pasture and does not provide any great quantity of feed. However, some of these trials experienced severe frosts, long dry periods at sowing, and severe grazing management.

In the trials chicory was sown as a pure stand, in pasture mixtures, and in herb mixtures. No consistent sowing rate was used in the mixtures, though 2lb. per acre was the most frequent rate. (A typical English herb mixture lists 3lb. per acre.) Three trials were pure stands of chicory. For one trial, an experimental plot on tussock, no seeding rate is given, but a good stand of healthy plants well eaten by sheep was reported. Another used 8lb. per acre drilled, but this rate was apparently too heavy for drilling. The third used 4lb. per acre, and too thin a cover resulted.

These 15 trials provide no evidence that chicory is a valuable plant except perhaps on some of the lower-fertility land which dries out in summer. Under these conditions chicory may be regarded as a drought-resistant plant which will provide some feed when many other plants are non-productive. Future trial work with chicory will be concentrated in this type of country.

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—A. B. O'BRIEN

Use of Hormones to Control Time of Lambing and Lambing Percentage

[*Niederer*

The normal process of reproduction in sheep being demonstrated by Dr. Wallace to farmers at the field day at this year's Ruakura Farmers' Conference.

A METHOD of injecting ewes with hormone materials that has been developed and tried out at the Department of Agriculture's Ruakura Animal Research Station was described in a paper at this year's Ruakura Farmers' Conference as "a thoroughly reliable and effective way of obtaining considerably improved lambing percentages". Dr. L. R. Wallace, Chief Animal Nutrition Officer, in drawing attention to the tremendous scope for improvement in lambing percentages, said that if good percentages were to be obtained, a high proportion of ewes must be made to shed two or more eggs at mating. Though the work at Ruakura with hormones to achieve this was still in the experimental stage, it had given promising results and would be tested under farm conditions if a few farmers near Ruakura would offer co-operation. An adaptation of Dr. Wallace's paper follows.

THERE is little need to stress the very great importance of the lambing percentage level in relation to the well-being of the sheep industry, and it must be agreed that in most districts there exists tremendous scope for improvement in this respect.

Many factors contribute to the low lambing percentages that are only too often obtained. Thus, some ewes die before lambing and some fail to lamb. Lamb losses, both at the time of birth and during the first few weeks of life, can be distressingly heavy; they are probably seldom less than 10 per cent. and may exceed 20 per cent. One of the most important considerations, however, is undoubtedly the low average number of lambs produced by the ewes which do lamb.

The crux of this problem is that the number of lambs produced by a ewe depends to a very great degree on the number of eggs she sheds at the time she is mated. It does not depend entirely on this, for some of the eggs shed may not be fertilised or may die at some stage after fertilisation, usually during early pregnancy. But if only one egg is shed, there can be only one embryo and only one lamb born, whereas if two are shed the odds are rather better than two to one that twins will be produced. Hence, if a good lambing percentage is to be obtained, a high proportion of the ewes must be made to shed two or more eggs.

This can be achieved in a number of ways. Farmers at the Ruakura Farmers' Conference 2 years ago were shown how it can be done by a properly executed flushing programme. This article describes another method, one with which few farmers, if any, will at present be familiar. It is a method which has become possible only as a result of a considerable amount of investigation carried out in many different research laboratories. It is a method which involves the injection of hormone materials and which has been developed and tried out at Ruakura.

The Reproductive Process

To understand the basis of the method it is necessary to know something of the normal process of reproduction in sheep. Most breeds of sheep are unlike cows in that they will not breed all the year round. It is only during part of the year that the ewes can be mated; during the remainder of the year they are just not interested in the rams.

In the Waikato Romney ewes usually start coming into heat toward the end of February, though many may not have their first heat until well into March. The length of the heat period varies a little, but the average is about 30 hours. After a ewe has once come into heat she will normally continue to do so at fairly regular intervals of 16 to 17 days until about August, which represents the end of the breeding season; unless, of course, she is successfully mated, in which case she will have no further heat periods while pregnancy continues.

The ewe's eggs are produced in small bodies called the ovaries. There are two of these, each about the size of a large raisin, one lying on either side of the body. Each ovary is surrounded by a delicate funnel-like structure which narrows down into a fine tube leading to the womb.

Shedding of Eggs

During the breeding season there are usually a number of small blisters on the surface of the ovaries, and during the 3 or 4 days before a ewe comes on heat one or more of these grows rapidly bigger. Each of these blisters is filled with a watery fluid which contains a substance called oestrogen and each also contains a single ripening egg. By the time the ewe comes into heat these blisters have become quite bulging and very thin walled and a few hours after the end of heat one or more of them bursts, releasing the egg. The egg passes into the funnel where, if mating has taken place, it is fertilised by a sperm from the ram and then travels down the fine tube into the womb.

When a blister bursts it collapses like a ruptured balloon. However, the cells lining the walls of the burst blister multiply rapidly and soon the whole cavity is filled with a solid mass of tissue which is called the yellow body. This yellow body grows larger during the next few days and reaches its greatest size about 10 to 12 days after heat, when it is about the size of a pea. If the ewe becomes pregnant, the yellow body persists throughout pregnancy. If the ewe does not become pregnant, it starts to die away after about the twelfth day, and as it dies away another crop of blisters begins to grow and the whole process is repeated. This yellow body produces a very important substance called progesterone, which will be referred to later.

Two very important questions can now be asked: First, what causes the blisters to grow and the eggs to ripen during the last few days before heat, and secondly, what causes the ewe to come on heat? Clearly, if the answer

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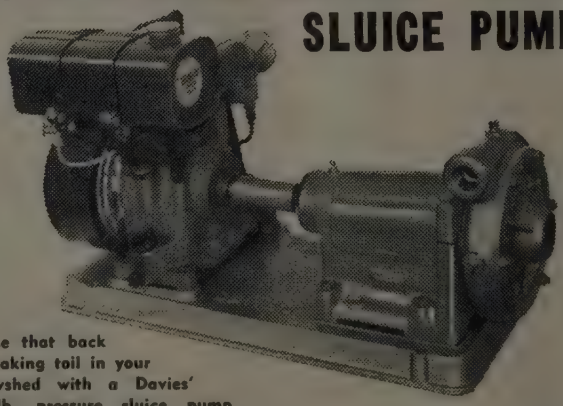

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to each of these two questions is known, it may be possible to help control things to the farmer's advantage, either by doing something to make the ewe ripen more than the usual number of eggs or by making her come on heat at times when she is wanted to rather than whenever she feels inclined.

Pregnant Mare Serum

The ripening of the eggs is normally caused by a hormone substance produced by a small gland, the pituitary, situated at the base of the brain, and the greater the amount of this substance that is released by the pituitary into the bloodstream the greater will be the number of eggs ripened. Some years ago it was discovered that a substance which has very much the same effect is present in large amounts in the blood of pregnant mares between the 45th and 90th days of pregnancy. If mares that are in foal are bled at this stage, the blood collected and allowed to clot, and the serum obtained, about 1/6oz. of it injected under the skin of a ewe a few days before she is due to come into heat will cause considerably more than the usual number of eggs to be ripened and shed. If a fairly high dose level is used, a dozen or more eggs may be produced instead of the normal one or two eggs.

In practice it is very important not only that the correct dosage should be used, but that it should be given at the correct time. If the dosage is too low, a worthwhile increase in lambing percentage will not be obtained. If the dose is too high, there is a double risk; an unduly high proportion of the ewes may fail to conceive and return to the ram or many of the ewes that do conceive will produce too many lambs. At Ruakura, high dosage levels have been used in some experiments and occasional sets of quadruplets, quintuplets, and sextuplets have been born. Such lambs are very light at birth and many of them fail to survive. Also with such multiple pregnancies there are increased ewe losses during pregnancy.

Provided the correct dosage levels are used, these troubles are largely avoided and, as a result of work at Ruakura, it is now known what the correct dosages are for Romney ewes and also that best results are obtained from ewes injected on the 12th, 13th, or 14th day after heat.

Procedure with P.M.S.

In applying this method the following procedure is adopted. The ewes to be treated are run with raddled teaser rams. Every third day the ewes tupped by the teaser rams during the previous 3 days are marked in some way so that they can be drafted out and injected 12 days later. As soon as they have been injected the ewes are turned out with fertile rams. It has been found convenient to draft from the main flock at intervals of 12 days those ewes marked by the teaser rams during the previous 12 days. This smaller group of animals can then be kept nearby and brought into the yards every third day for drafting off and injection of those due for treatment.

The results obtained at Ruakura by this method have been quite encouraging. Pregnant mare serum treatment has not made the ewes any more difficult to get in lamb. A normal percentage has held to first service by the fertile rams and there has been no increase in the number eventually failing to get in lamb. The practice has led to a substantial increase in the number of lambs born, this increase being entirely due to a higher proportion of multiple births among the ewes that conceived at the first heat after injection. The ewes that do not conceive at their first mating but which get in lamb later, produce only a normal number of lambs. The results obtained in one trial at Ruakura in 1953 are shown in the following table:—

EFFECT OF P.M.S. ON LAMBING PERCENTAGE

Group	Lambing percentages	
	Lambs born per 100 ewes lambing	Lambs alive at 28 days per 100 ewes lambing
Untreated	131	116
Low dose P.M.S. ..	178	130
High dose P.M.S. ..	192	145

There is not the slightest doubt that the method outlined provides a thoroughly reliable and effective way of obtaining considerably improved lambing percentages. It has, however, certain disadvantages.

First, teaser rams have to be used and these cost money, though low-priced animals are quite suitable. Secondly, there is the labour involved in carrying out the treatment. The teaser rams have to be caught and raddled fairly frequently and the ewes inspected at least once every 3 days to mark off those tupped during the previous 3 days. Every third day there is also the work of drafting off and injecting some of the ewes. Lastly, there is the important consideration of the effect of the treatment on the time of lambing.

On many New Zealand fat lamb farms the rams are put out with the ewes at the beginning of March or even earlier. This coincides with the beginning of the breeding season and most ewes are normally mated by the rams at their first heat period. With the pregnant mare serum injection method ewes cannot be mated before their second heat period, so that lambing is likely to be delayed by about a fortnight. Under certain circumstances

Diagram of the reproductive organs of a female animal. Starting at the rear of the animal, where the reproductive tract opens to the outside is a broad passage which leads forward and branches into the two horns of the womb or breeding bag, which contains the developing lamb or lambs during pregnancy. Each horn of the womb leads into fine tubes and each tube has at its end a small funnel, which surrounds the ovaries.

this may be a serious disadvantage, as for instance where early lambing is practised with a view to getting a high proportion of the lambs away to the works fat off their mothers before pasture growth slows and its quality deteriorates with the advent of dry summer conditions.

Recently a modified method of treatment has been tried at Ruakura to overcome these disadvantages. Clearly, what is needed is some means of inducing the ewes to come into heat together at some predetermined time, for then teasers would not have to be used, the whole flock could be treated over a comparatively short period, and lambing could be arranged to occur at the most convenient time.

Cause of Onset of Heat

Research work recently carried out overseas has shown that in ewes the onset of heat is controlled by the action of two hormones, progesterone and oestrogen. Progesterone is the hormone substance mentioned earlier which is produced by the yellow body which develops in the ovary of the ewe after an egg is shed, and oestrogen

is to be found in the fluid contained by the blisters which ripen during the few days before a ewe comes into heat. What happens during the normal breeding season is that between heat periods the ewe first receives a dose of progesterone produced by the yellow body and then as this dies away a dose of oestrogen produced by the newly ripened crop of blisters. As a result of the combined action of both these hormones she comes into heat.

Before the breeding season begins, however, the ovaries of a sheep are quite inactive. No eggs are ripened, no yellow body is formed, and in consequence neither oestrogen nor progesterone is produced, and so the ewes do not come into heat. But if the necessary hormones are artificially supplied, they can be made to do so.

Inducing Heat

The technique which so far has given best results consists of first treating the ewes with progesterone for a few days and then not with oestrogen but with pregnant mare serum. The purpose of the pregnant mare serum is to cause the blisters which will produce oestrogen to grow, ripen, and shed their eggs.

Work at Ruakura has been directed toward finding the minimum amounts of the two hormones that are needed to bring the ewes into heat and to make them shed a sufficiently large number of eggs to ensure a really good lambing percentage. It has already been found that an 8-day course of progesterone treatment gives better results than a shorter one (4 days) or a longer one (16 days), but work is still going on to find out how frequently it is necessary to inject the progesterone during this period and how long after the progesterone the pregnant mare serum should be given for the best results to be obtained.

Some idea of the amount of work involved in developing a really satisfactory technique of this kind is evident in the fact that this last season 24 different methods of treatment have been tried out.

Some promising results have been obtained. In one trial during February of this year a group of 96 5-year-old Romney ewes that had not previously been in heat were treated with progesterone for an 8-day period and then given a single injection of pregnant mare serum and turned out with fertile rams. Ninety-one came on heat and were mated within 7 days of the last progesterone injection, and 81 of these became pregnant. These were killed and examined when a month in lamb. Forty-eight of them had a single lamb, 28 had twins, 5 had triplets, and 1 had quadruplets, which gave an average of 1⅛ lambs per ewe.

It is interesting to compare the performance of these 96 treated animals with that of 32 ordinary untreated ewes which were grazed with them throughout the tupping period. Thirty-one became pregnant in late February and March, and when these were killed a month later 27 each had a single lamb and 3 had twins, an average of 1.1 lambs per ewe.

Progesterone Treatment

One or two points about the progesterone method of treatment deserve mention. The first is that there is nothing difficult involved in the operations that have to be carried out. Teaser rams are unnecessary, no tupping records have to be kept, and no drafting up of the ewes is required. As far as the injections are concerned, much less skill is needed than is needed, for instance, to castrate lambs, trim their feet, and crutch or drench them.

The second point concerns the number of ewes that should be treated simultaneously. Though it would be quite possible to treat the whole of a flock of, say, 1000 ewes to bring most of them into heat during the same 2 or 3 days, it would certainly not be desirable, because the rams would be grossly overworked if this were done. Clearly the sensible thing to do would be either to stagger the treatment of the ewes over a reasonable period or, to mention an interesting future possibility, to artificially inseminate the ewes.

Technically it is no more difficult to inseminate ewes than cows, and the artificial breeding technique could be employed most easily under conditions where virtually all the ewes in a flock could be brought into heat over 2 or 3 days. Costs might be rather high, but they are with natural service at present, for with Southdown rams costing about 30 guineas apiece, it costs about 4s. or 5s. to get each ewe in lamb.

The third point concerns the possible practical importance of being able to control accurately the date of lambing. During the last two seasons a substantial premium has been paid for fat lambs drafted sufficiently early in the season to reach the British market before Christmas. Should this premium payment be continued, producers might well become interested in having at least a proportion of their ewes lamb somewhat earlier than at present. Usually this cannot be done simply by putting the rams out earlier, but it could be accomplished by progesterone treatment.

Problem Arising from Facial Eczema

The fourth point concerns facial eczema, which in certain districts constitutes a major hazard for fat lamb producers each autumn. It too frequently happens that before and during tupping breeding ewes have to be heavily concentrated on small areas to prevent their consuming toxic pasture.

Flocks confined in this way are usually subject to a very low plane of nutrition and for this reason can be expected to produce only a small proportion of twins at lambing. Under such circumstances the pregnant mare serum or progesterone technique should prove particularly useful. The ewes are normally kept in small paddocks near the sheep yards, which would enable the injections to be performed conveniently, and very worthwhile increases in lambing percentages would result from treatment.

Availability and Cost of Hormones

A few remarks about the nature, availability, and cost of the two hormone materials used may be of interest. Progesterone can now be manufactured synthetically. It is still expensive, but much less expensive than it was a few years ago. Commercially prepared pregnant mare serum is readily available, but it is also rather costly. The price might well be reduced, however, if there were a large-scale demand for it.

As already mentioned, pregnant mare serum is obtained from the blood of mares between the 45th and 90th day of pregnancy. If bled at intervals over this period, one mare should provide enough material to treat about 500 sheep.

Ultimate Aim

The main purpose of this article has been to acquaint farmers with some of the hormone work being carried out at Ruakura. The ultimate aim is to provide a method which can be easily and economically applied on farms to ensure that a good lambing percentage is obtained and that the lambs are born at the most convenient time. An attempt has been made to give some idea of the theory behind this work, of how it is being undertaken, and of the results so far achieved. It must be emphasised that the work is still in the experimental stage. However, a method of treatment which has given promising results at Ruakura has been developed and the Station hopes, with the co-operation of farmers handy to Ruakura, to test this method further under farm conditions to see how it works in practice.

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Economic Aspects of Weed Spraying with Hormone Weedkillers

By G. MASON,

Research Officer, Farm Management, Department of Agriculture, Christchurch

CHEMICAL weed control is becoming a significant item in some farmers' costs. Value of imports of raw materials for weed-killing preparations alone has increased from £88,000 in 1949 to £611,000 in 1954 and considerable amounts are spent annually by farmers in applying these preparations.

TO obtain some information about the economics of spraying weeds in pasture and crops officers of the Department of Agriculture collected during 1954 cost data from a small number of farmers who were undertaking the work with their own equipment, and at the same time some information was obtained from farmers who had had the work done by contractors.

Spraying with Own Equipment

The spray equipment considered was for low-volume work and in most cases it consisted of a power take-off unit mounted on a tractor or a unit mounted on a trailer drawn by a tractor. Some units were constructed and most were assembled by the farmers and consequently values varied considerably, but the average value of the units was £52. They comprised spray containers (commonly 44-gallon drums), pump, pressure gauge, boom, hose, and necessary piping. To arrive at the overhead costs of operating the equipment it was assumed that the units had a life of 10 years and depreciation was therefore 10 per cent. or £5 4s. per annum. Interest at 5 per cent. was allowed on the value and amounted to £2 12s. per annum, and the average cost of repairs and maintenance worked out at 19s. 7d. per annum.

Spraying Weeds in Pasture

The average area of pasture sprayed by the group of farmers was 82 acres. The average time taken in applying the spray was 17½ minutes per acre and if the time for assembling the equipment and cleaning it after each spraying (2½ minutes per acre) was added, the time came to 20 minutes per acre. Of the 46 fields sprayed 22 had 2,4-D preparations applied and the remainder salts of M.C.P.A. An application rate of 0.75lb. of acid equivalent per acre was taken in the following calculations. With these data an average cost per acre was computed (see Table 1).

Naturally there was a wide range of costs per acre owing to such factors as the type of weed and density of cover, which consequently accounted for variations in the amount of spray applied per acre. The most common weeds sprayed were Californian thistle, other thistles, buttercup, and flat weeds in that order. Table 2 shows the range in costs.

One advantage of the farmer's having his own equipment is that he will be able to undertake weed control at a suitable time and make fuller use of his tractor.

TABLE 1—AVERAGE COST PER ACRE TO SPRAY WEEDS IN PASTURE

Fixed costs	Shillings per acre
Depreciation at 10 per cent. ..	1.27
Interest at 5 per cent.	0.63
Repairs and maintenance ..	0.24
	2.14
Variable costs	
Labour (0.33 man hours at 6s. per hour)	1.98
Spray (0.75lb. of acid equivalent at 15s. per lb.)	11.25
Tractor (0.29 hours at 6s. per hour)	1.74
	14.97
Total	17.11 (17s. 1d.)

TABLE 2—RANGE OF COSTS PER ACRE FOR SPRAYING WEEDS IN PASTURE

Cost per acre Shillings	Number of cases
5 and under 10	5
10 and under 15	5
15 and under 20	15
20 and under 25	9
25 and under 30	4
30 and under 35	3
Over 35	5
	46

Spraying Weeds in Cereal Crops

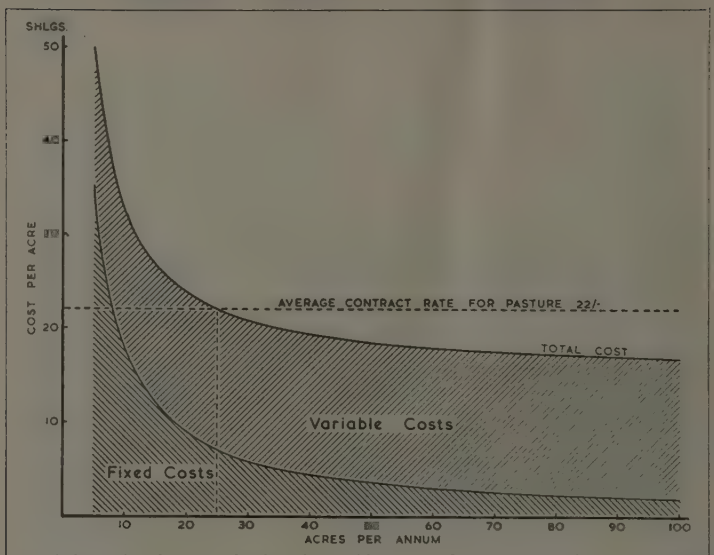
The times taken in cereal crop spraying were similar to those for spraying weeds in pasture. Spraying time averaged 15½ minutes per acre and if the time taken to assemble and clean the equipment is added, the average time per acre was 18½ minutes.

Of the 40 fields sprayed, 26 had applications of 2,4-D. Here again the application rate was 0.75lb. of acid equivalent per acre. The crops sprayed were wheat and barley and the weeds were mainly Californian thistle, wild turnip, and some fat-hen. On the basis of an average area of 70 acres sprayed per annum an average cost was computed.

TABLE 3—AVERAGE COST PER ACRE TO SPRAY WEEDS IN CEREAL CROPS

Fixed costs	Shillings per acre
Depreciation at 10 per cent. ..	1.49
Interest at 5 per cent.	0.74
Repairs and maintenance ..	0.28
	2.51
Variable costs	
Labour (0.39 man hours at 6s. per hour)	2.34
Spray (0.75lb. of acid equivalent at 15s. per lb.)	11.25
Tractor (0.26 hours at 6s. per hour)	1.56
	15.15
Total	17.66 (17s. 8d.)

There was a wide range of costs for spraying weeds in crops as with weed spraying in pastures.



Relationship between fixed and variable costs of spraying weeds in pastures.

TABLE 4—RANGE OF COSTS PER ACRE FOR SPRAYING WEEDS IN CEREAL CROPS

Cost per acre Shillings	Number of cases
10 and under 15	6
15 and under 20	17
20 and under 25	7
25 and under 30	8
Over 30	2
	40

Contract Spraying

Spraying Weeds in Pasture

The average price per acre charged by contractors for spraying weeds in pasture was 22s., but because of the differences in classes of weeds, degree of infestation, and type of hormone spray (and consequently the quantity of spray used per acre) there was a considerable variation in costs. The weeds sprayed comprised Californian thistle, Scotch thistle, buttercup, docks, and ragwort. The variation in costs is shown in Table 5.

TABLE 5—RANGE OF PRICES CHARGED FOR SPRAYING WEEDS IN PASTURE

Cost per acre Shillings	Number of cases
10 and under 15	5
15 and under 20	5
20 and under 25	2
25 and under 30	9
30 and under 35	7
	28

Spraying Weeds in Cereal Crops

The crops sprayed were wheat, barley, and oats in that order, and the weeds sprayed included wild turnips, Californian thistle, Scotch thistle, tares, and fat-hen. The average charged per acre was £1 5s. 6d. and the range in charges is shown in Table 6.

TABLE 6—RANGE OF PRICES PER ACRE CHARGED FOR SPRAYING WEEDS IN CEREAL CROPS

Cost per acre Shillings	Number of cases
10 and under 15	2
15 and under 20	1
20 and under 25	5
25 and under 30	7
30 and under 35	9
	24

Is Spraying Worth While?

The economics of hormone weed spraying can be assessed by the extra production achieved by its use. The Department of Agriculture has carried out trials with cereals to measure increases in production. For cereal crop spraying an average contract cost of 25s. 6d. per acre is equivalent to a return from production increases of approximately 2 bushels of wheat or about 3 bushels of barley per acre. Increases greater than this have been recorded. No trials are available to indicate the increase in yields from spraying of normal pasture. However, if the average contract cost of spraying pasture is 22s. per acre, this is equivalent to a return from production increases of about 7lb. of butterfat per acre, or 11lb. of lamb meat per acre, or 5½lb. of wool per acre. As pastures in many instances will not be sprayed every year, the above cost will be spread over more than one year and the production increases to meet this cost will therefore be less.

Equipment

An attempt was made to show the relationship between fixed and variable costs of spraying weeds in pasture and how the fixed or overhead costs on a per acre basis decrease as the total area sprayed increases. As shown previously fixed costs include depreciation, interest on the value of the equipment, and repairs and maintenance. These costs remain substantially the same irrespective of the acreage sprayed. Therefore, where large acreages are sprayed the fixed costs per acre are lower. On the other hand variable costs, which include spray materials, labour, and tractor, remain practically the same per acre regardless of the area sprayed. The graph at left illustrates these points.

The graph shows how fixed costs per acre decrease rapidly as the acreage sprayed per annum increases. For instance, for spraying 10 acres per annum fixed costs amount to about 17s. 7d. per acre, and for 40 acres per annum are less than 4s. 6d. per acre.

With an average contract rate of 22s. per acre for spraying weeds in pasture it appears that where a farmer has less than 25 to 30 acres per annum to spray it may not be economic for him to have his own spray equipment. These average 1954 figures can only be used as a guide and adjustments will be necessary if it is intended to use equipment or material of a different kind or value.

One advantage in the farmer possessing his own equipment is that he will be able to undertake weed control work at a convenient and suitable time and he will be able to make fuller use of his tractor.

Reference

The Economics of Crop Spraying. Farmers' Bulletin No. 16. School of Agriculture, Cambridge University.

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Trees on the Farm

Protecting the Woodlot

BEFORE a plantation can be classed as established some work may be needed to combat vigorous weed growth. Protective measures may have to be taken to safeguard the woodlot against other enemies, and the more important of them are referred to briefly in this article by W. H. Jolliffe, Forestry Extension Officer, New Zealand Forest Service.

VARIOUS aspects of tree growing on farms have been discussed by the author in a series of articles which was begun in the March 1955 issue of the "Journal".

Fire

Fire is the worst enemy of woodlots. In small plantations it may not be worth taking special precautions, but in large plantations the growing asset fully justifies them. Clean, well-farmed land is the best safeguard against fire. Failing this, a ploughed or chipped firebreak, or even a few rows of non-inflammable species, such as Douglas fir, larch, poplars, or oaks, form good fire insurance. Larger areas still (say over 100 acres) should be subdivided by fire lines which, if narrow, should be bordered by non-inflammable species.

Fire usually starts on or near the ground and rarely originates inside the stand. On the ground it can be fairly easily controlled if tackled promptly while it is still small. If the fire rises to the crowns of the trees, suppression becomes much more difficult. To reduce the chances of small fires becoming big fires it is wise to low prune all stands as early as possible and to burn the litter of branches, at least from along the marginal rows.

▲ Clean pastures surrounding woodlots afford the best protection from fires. These plantations are on a farm in the Inglewood district.

Weeds

Newly planted trees do not make much growth during the first year and may tend to become smothered by rank weed growth falling over on to them. Tall bracken fern is very bad in this respect. In such circumstances the young plants should be released by cutting back the encroaching growth.

Cutting back is best done with a billhook or a single-handed slasher so that the other hand can hold the material to be cut. A two-handed slasher is not recommended, as it is too easy to destroy young trees with this tool. With slow-growing species or fast-growing weeds cutting back may have to be repeated two or three times.

Animals

All farm animals should be kept away from a plantation until the

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Read the letter quoted below, from Mr. W. R. Wilson of Herbert who wrote to us on June 29

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What made me think the birds were fond of it, I put a block out in front of a shed for my hoggets. Well, the hens were never away from it, so I put a block in every shed, and the results are amazing. Even the older birds have come up 20 per cent.

To get over 500 eggs from 900 pullets in winter with no lights is extra good, so once again thanks to your 'Molactrate'.

rough bark has formed or at least until the crowns are sufficiently high to avoid injury. This usually means fencing and, if rabbits and hares are present, the fence must have netting as well. The fence should be at least 8ft. away from the outside line of trees.

Individual poplars and willows planted as rooted poles in the open in stock paddocks have been effectively protected by painting the trunks with creosote or by a ring of manuka brush held by a spiral of barbed wire.

Insect Pests and Fungous Diseases

A healthy, vigorous stand of species suited to the site is the best insurance against insect pests and fungous diseases. However, even in such a stand entry is afforded pests or diseases if the protective bark is gapped by the blazing of trees or by carelessness in pruning, felling, or snigging. It is wise to cover any accidental injury with Stockholm tar or paint.

The health of a plantation can, of course, suffer if thinnings are neglected, if dead material is left lying about the plantation to serve as a breeding ground for pests and diseases, and if there is any sudden or prolonged raising or lowering of the water-table.

Climatic Accidents

Damage can be caused by snow, excessive rain, drought, heat, frost, and wind, but only the last can be countered by silvicultural treatment and the others are usually not severe enough to cause lasting trouble.

In an area subject to high winds height growth must not be unduly encouraged. Very tall trees in a shallow soil will blow over, and in a free soil such as sand or pumice top breakage will occur. Consequently early and regular thinnings must be made to reduce height growth to a minimum and to encourage firmness of the rooting system. An additional safeguard is to carry out low pruning right to and including the outside rows of trees so that the force of a gale will be dissipated within the stand.

CURRENT WORK

Seed sown in October should be germinating this month, especially if it has been protected by frames covered with scrim, slats, or leafy branches. Weeding should be begun early and at no stage should weeds be allowed to become so big that their removal may result in the seedling trees being pulled up with the weeds.

Young trees planted earlier in the year should be examined to see if it is necessary to cut back adjacent weed growth that might be endangering them.

A clean interior reduces the risk of fire and does away with possible breeding grounds for pests and diseases.

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Experiments in

Hastening Maturity of Apricots with Hormone Sprays

SPECIAL formulations of 2,4,5-T (2,4,5 trichlorophenoxyacetic acid), commonly known as a hormone brush killer, have been used in preliminary trials on apricots to induce earlier fruit maturity and increased fruit size. Results to date have been encouraging and so that growers may become conversant with the results of these trials the following article has been prepared by W. S. Kemp and D. W. Wilson, Horticultural Instructors of the Department of Agriculture at Alexandra and Roxburgh respectively.

ABOUT 1950 research workers in California found that the application of 2,4,5-T considerably hastened the maturity of figs. The question then arose as to whether stone fruits would show a similar response and in 1951 a small-scale trial was laid down on apricots. Results were so promising that in following years trials were carried out on a commercial scale. Results on other stone fruits, however, did not give the same promise. On apricots maturity was considerably hastened, by up to 18 days in some instances, and in addition fruit size was appreciably increased.

The tips of vigorously growing shoots were killed, there was some leaf distortion, and under some conditions a certain amount of fruit cracking and splitting along the sutures resulted. The stoppage of growth, however, was of little consequence, as winter pruning eliminated affected wood.

N.Z. Trials Warranted

From Californian evidence it appeared that advantages outweighed disadvantages and that trials with 2,4,5-T under New Zealand conditions were warranted. As it was considered that the greatest benefit to commercial growers would result from its use on early maturing varieties, Newcastle was the one selected for trial.

Growers in the Alexandra and Roxburgh districts were approached and arrangements were made to conduct trials in the 1953-54 season. Unfortunately, however, a severe frost in late September 1953 so reduced the apricot crop that trials had to be postponed until the following season.

Concentrations

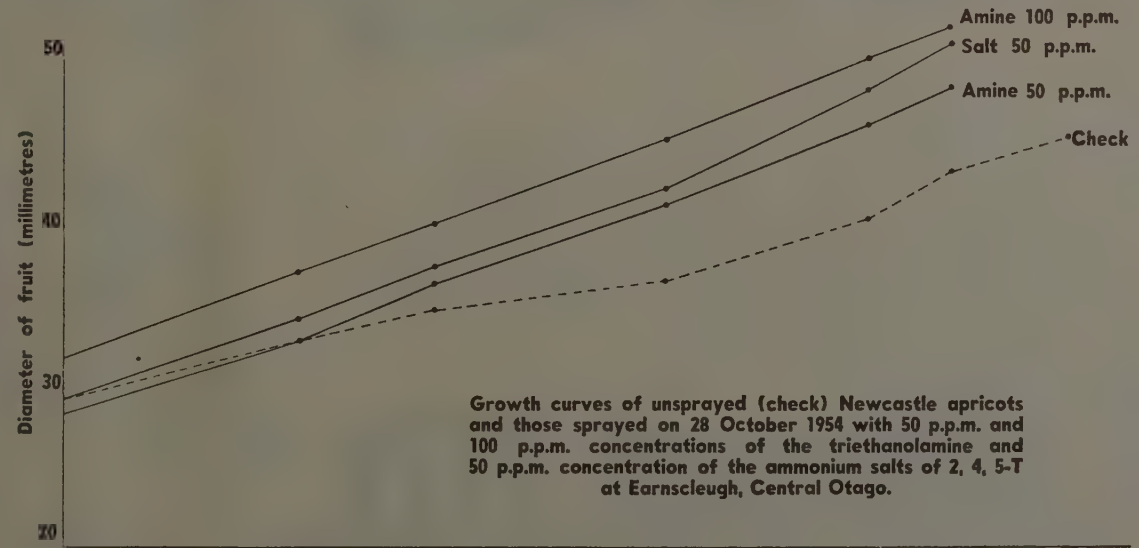
American work indicated that the best time to apply the spray was at the beginning of pit hardening and that the shorter the period was between pit hardening and harvesting the higher was the concentration required for optimum results. Under their conditions the greatest increase in size and maturity had been obtained by using 2,4,5-T at a concentration of 100 p.p.m. (parts per million) of water.

Some initial work carried out by Department of Scientific and Industrial Research at its Earnscleugh Research Orchard appeared to indicate that severe damage could result from a 100 p.p.m. concentration through the failure of buds to break in the following spring, though no such damage had been reported in American work. Thus it was decided to use mainly weaker concentrations to reduce the possibility of tree damage. Three different formulations of 2,4,5-T were used: The triethanolamine salt at 25, 50, 75, and 100 p.p.m.; the ammonium salt at 25, 50, and 100 p.p.m., and the polyethylene glycol ester at 25 p.p.m.

Trial Sprays

Trials were carried out on three properties, one in each of the Clyde, Earnscleugh, and Coal Creek areas, sprays being applied on 29, 28, and 28 October respectively. Pit hardening had begun by this date, which was 40 to 45 days after petal fall. In some cases thinning was carried out before and in others after spray application.

Generally whole trees were sprayed, but in one trial where the higher concentrations were used only half trees were sprayed, the other halves of the trees being used as a check. One branch of each tree or half tree was tagged and the diameter of 20 fruits on each measured at time of



Growth curves of unsprayed (check) Newcastle apricots and those sprayed on 28 October 1954 with 50 p.p.m. and 100 p.p.m. concentrations of the triethanolamine and 50 p.p.m. concentration of the ammonium salts of 2, 4, 5-T at Earnscleugh, Central Otago.

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spraying and at intervals until harvesting began. Picking of fruit began 3 to 7 days earlier on treated than on untreated trees, and on some treatments a light picking could have been made a few days earlier still.

There were marked variations between trees receiving different concentrations of the same material, between trees receiving the same concentration of different materials, and also between trees receiving identical treatment; in the last case, tree vigour appears to have had a definite bearing on the result.

On the basis of increase in diameter from time of spray application until picking began, fruit from treated trees was larger by varying amounts, sometimes up to 30 per cent., than fruit from untreated trees. Fruit colour was also increased, but it varied considerably between the three localities.

Effects on Foliage

As in California there was some foliage damage; however, in one block the effects were so slight as to be detected only on careful inspection. The growing points of vigorous shoots were killed, young leaves distorted, and a general flagging of foliage was evident for a time. As the time of spray application roughly coincided with the slowing up of the first and main growth flush sufficient growth was made for the production of next season's crop. In many instances new growth later developed from some of the affected shoots.

Though there was not a greal deal of difference between treatments, those receiving the higher concentrations were the worst affected. On the other hand the development of fruit buds on treated trees appeared to be far better than on untreated ones.

Fruit Cracking

A certain amount of fruit cracking occurred, particularly in trees receiving the higher concentrations, but as rain fell about a week before the first pick, it was not possible to determine whether the cracking was a result of hormone application or the effect of rain on nearly mature fruit. Most of the cracks were dry and so small as to not affect markedly the market value of the fruit.

Though the results of the past season's trials are promising, further work is necessary before any definite recommendations can be made to growers.

Various points such as the most effective concentrations and formulations of 2,4,5-T and the effect of repeated application over a number of years require further investigation. Though in California trees have been treated for three successive seasons without detrimental effect to cropping and tree growth, this may not be so under New Zealand conditions.

Satisfactory Results

From the past season's results it appears that a concentration of 50 p.p.m. of 2,4,5-T will give the most satisfactory results, as the risk of damage to foliage and fruit is lessened yet the increase in fruit size and hastening of maturity are substantial. Thinning before spray application appears advisable, as this prevents the tree carrying an excessive number of fruits during the period immediately after spray application when foliage efficiency is most impaired.

These experiments were carried out on the Newcastle variety, but similar responses are likely to be obtained from other apricot varieties. Though it was considered that the application of 2,4,5-T would have more commercial value with early maturing varieties, the possibility of hastening ripening of later varieties would no doubt be of considerable benefit to many growers with large blocks who by spraying part of the area could spread harvesting over a few more days.

Additional Responses

Californian work has also shown the following additional responses to the application of 2,4,5-T:—

1. Pre-harvest drop on varieties subject to this trouble was considerably reduced.

2. Frost-damaged fruits could be brought to maturity where 2,4,5-T was applied before or within 48 hours of a frost occurring, even though the ovules were damaged.

These aspects have not been fully tested locally, though some preliminary work has been done, chiefly on frost damage. Use of 2,4,5-T under New Zealand conditions for this purpose, however, would seem to be restricted to frosts occurring about or after the beginning of stone hardening, because where 2,4,5-T is applied earlier, tree damage is considerably increased.

Experimental Stage

The use of 2,4,5-T to induce earlier maturity is still in the experimental stage and considerable damage could result from indiscriminate application.

It is emphasised that no information is available under New Zealand conditions on the effects of the materials on tree growth the following year. Any grower contemplating the use of 2,4,5-T should get in touch with the local Horticultural Instructor so that the proposed application can be discussed and planned to give as much information as possible.

Acknowledgment

Messrs. R. M. Robertson, Clyde, A. M. Kinnaird, Earnscleugh, and T. Michelle, Roxburgh, are thanked for their co-operation in making trees available for the trials.

"The Romance of the Australian Land Industries": R. D. Watt

IN its earlier stages of development New Zealand farming drew heavily on Australian experience and if, in more recent years, the contact has not been very close, a history of the development of Australian farming is of wide interest. Beginning with the first primitive attempts at cultivation after the arrival of the "First Fleet" at Botany Bay in 1788, Professor Watt has traced the growth of Australian farming to its present widely diversified production and efficient organisation of marketing and scientific research.

The story has been one largely of adapting Old World techniques to a strange and often hostile environment. The pioneers in various fields deserve special mention, because they showed the way to others and by their persistence convinced the sceptics. John Macarthur, the first pastoralist, the Gibson and the Peppin brothers, as stud breeders, the Chaffey brothers, with their introduction of large-scale irrigation, William Farrer, the pioneer wheat breeder, Thomas Sutcliffe Mort, who backed the first experiments in refrigeration, and many others all played their part, and posterity not only in Australia but in New Zealand owes them a heavy debt.

In more recent years scientific research has played an important part in the development of Australian rural industries and is likely to be even more significant in the future. Professor Watt draws attention to the progress being made in various fields and makes a realistic appraisal of the lines along which future development is likely to take place. But he also emphasises the fact that about one-third of Australia is either desert or capable of carrying only a very sparse stock population. Such a sober analysis does much to dispel some of the ideas about an "empty continent".

—*P.R.S.*

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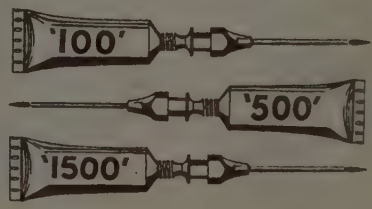

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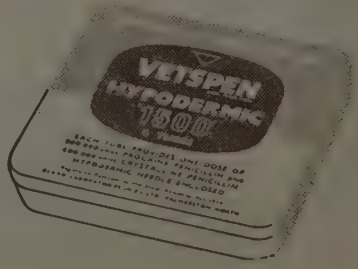


The Treatment of Mastitis

RECENT Press publicity regarding the use of penicillin in the treatment of mastitis in dairy cows at dosage rates much higher than have usually been recommended in New Zealand may have led to some confusion in the minds of dairy farmers. That a good standard treatment is still 25,000 units of penicillin a day for 3 days was stated by N. R. McDonald, Veterinary Research Officer, Department of Agriculture's Wallaceville Animal Research Station, in an address at the 1955 Ruakura Farmers' Conference.

SINCE the advent of penicillin and other antibiotics mastitis is no longer the serious problem it was formerly, but it can still be a cause of considerable production loss.

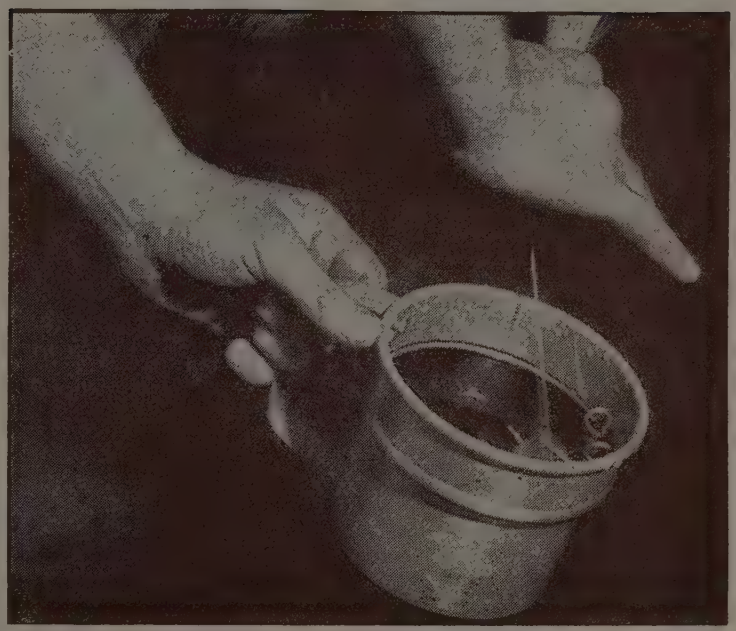
Symptoms

In an inflamed udder varying degrees of tissue damage occur and a change in the appearance of the milk is seen. In the sudden, acute case the milk can be greatly altered in the early stages. It may be tinged with blood and contain flakes or clots or it may be yellowish, thin, or watery. It should be remembered, however, that the milk may also be abnormal if the cow is severely ill from some other cause, and blood may appear in the milk from a blow or other injury to the udder. The cow that shows abnormal milk at irregular intervals without being unduly upset is not uncommon and is regarded as suffering from the chronic type of infection.

Mastitis can be caused by a number of different bacteria. It is usually not possible to tell from the appearance of the milk which one is involved, and laboratory methods must be used to decide. The commonest cause of mastitis in this country, as in others, is *Streptococcus agalactiae*. In an acute attack the cow may be shivering, the infected quarter may be hot and hard, and the milk may be abnormal. In the chronic form repeated bouts of mastitis of a milder nature usually involving hardness of the quarter and abnormal milk occur. The disease may become chronic after an acute attack.

The other common cause of mastitis is *Staphylococcus aureus*. The acute case is often very severe, the cow having a high temperature and abnormal milk, and gangrene of the udder may occur. The chronic case is similar in symptoms to chronic streptococcal mastitis and must therefore be differentiated promptly by laboratory methods.

Bacteria can be present in an udder without causing symptoms, but aggravation by some factor such as injury or a badly adjusted machine may precipitate an attack.



The use of a strip cup aids early detection of mastitis.

Treatment

The number of antibiotics used in the treatment of mastitis has increased steadily over the last few years, but one of the earliest and commonest is penicillin.

Penicillin is generally used in an oily vehicle which has been found to be satisfactory in the treatment of mastitis cases. It is usually in the form of the procaine salt, from which the penicillin is released over a period so that a useful concentration of the drug is maintained in the udder as long as possible.

Though it is agreed that penicillin is effective as a standard treatment for mastitis, from time to time questions have arisen regarding the dose rate for general use. In the great deal that has been written about the treatment of common mastitis with penicillin it is difficult to find evidence for increasing the dose recommended for general use; that is, 25,000 units given after milking once a day for 3 days. For good results, however, the full course of treatment must be given even if the milk becomes normal in appearance after the first or second dose.

This treatment is based on the fact that the majority of mastitis cases are due to *Streptococcus agalactiae*. This organism can be successfully treated by this amount of penicillin, and there has been no sign of its becoming resistant to penicillin in Britain, the United States, Australia, or New Zealand. If, however, the symptoms are due to one of the other pathogenic organisms, variation in treatment may be required.

In an acute case of the other common cause of mastitis, *Staphylococcus aureus*, the cow may appear normal at one milking but may be shivering and almost without milk at the next, with the beginning of gangrene visible in the udder. This presents a difficult treatment problem which is a job for the veterinary surgeon, who usually has to try to save the cow rather than the quarter.

The chronic case, with the milk similar in appearance to that produced by a cow suffering from chronic streptococcal mastitis, has also proved difficult, and many treatments have been suggested and tried. No individual treatment appears definitely superior. A recent trial in Britain showed that one tube of aureomycin a day for 4 days cured 66 per cent. of 24 cases of staphylococcal mastitis. Some workers have achieved a higher percentage of cures and others a lower percentage.

Because streptomycin and penicillin combined are believed to acquire an additional effect, some workers have used them in the treatment of chronic staphylococcal mastitis.

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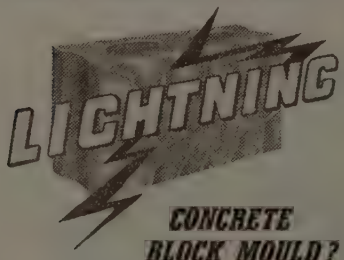

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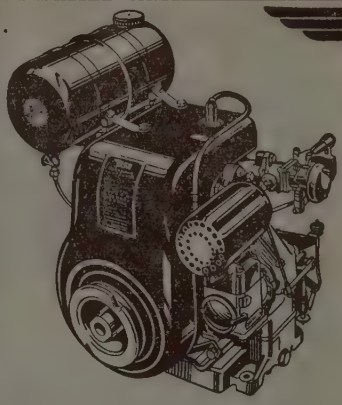

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In California 1 gm. of streptomycin and 1 million units of penicillin were given daily for 4 days and 70 per cent. of 20 quarters cleaned of *Staphylococci*, but British work has suggested that penicillin, aureomycin, or streptomycin given alone in amounts sufficient to maintain a therapeutic level in the quarter for 8 days is equally effective in ridding the udder of *Staphylococci*. It is the opinion of a number of authoritive workers in this field that no antibiotic has established a definite superiority over penicillin in the treatment of these staphylococcal cases.

Variations of treatment are being tried. For instance, overseas work indicates that if cobalt is added to penicillin, its action against *Staphylococci* may be increased. Another approach is to endeavour to increase the penetration of the antibiotic by removing clots and other debris which are blocking the ducts and preventing the passage of the antibiotic into parts of the quarter. One of the methods of doing this outlined recently by Dr. W. E. Petersen, of the University of Minnesota, was the injection of oxytocin, which by causing contraction of the muscles in the udder tissue squeezes the occluding material down into the cistern. From there it can be milked out and the antibiotic immediately infused.

Antiseptic Precautions

Antiseptic precautions are highly important in treatment. The end of the teat should be wiped clean with methylated spirit, special attention being paid to the entrance of the teat canal. This is to prevent any foreign material being carried into the gland by the nozzle of the tube. When the cap of the tube is removed the sterile nozzle should not be touched but should be immediately inserted into the opening of the teat canal and the dose delivered. Since the volume of the dose is small, any loss is important, as it may contain an appreciable amount of the antibiotic. It is a good idea to keep hold of the end of the teat and massage the dose up into the gland with the other hand. The earlier treatment is given the better. A strip cup is handy for detecting cases in the early stages.

Care in treatment was emphasised by Dr. Petersen in his discussion of dosing with penicillin and streptomycin in water. He stated "We always advise farmers to call on the services of their local veterinarian for treatment of mastitis in this way. We do this for the reason that veterinary diagnosis is of value in the first place and unless the teat orifice is particularly well cleaned and sterilised, there is danger of introducing organisms into the quarter being treated which are unaffected by antibiotics".

Failure of Treatment

Failure of treatment shown by milk remaining abnormal or becoming abnormal again a day or so after treatment ceases may be due to a number of factors. The organisms causing mastitis may not be susceptible to penicillin.

The cause of the infection may be *Streptococcus agalactiae*, but it may be accompanied by other organisms. If these organisms are the type capable of producing a penicillin-destroying substance, they protect the *Streptococcus* against treatment.

The penicillin may not have been able to reach all the organisms present because the ducts were blocked with clots or the small growths which arise from the duct walls in some infected quarters.

When infection reappears in a previously infected quarter some weeks after treatment has ceased it could be a fresh infection or a flare up of the one treated earlier. That it may be a fresh infection is supported first by the fact that penicillin in suitable doses is known to remove *Streptococci* entirely from the udder in a high percentage of cases, and, secondly, by the fact that once an animal has had mastitis it is much more likely to get reinfected than one which has never been infected.

Persistence of Penicillin

The fact that penicillin, aureomycin, and terramycin inhibit the starter in cheese vats is well known and the persistence of antibiotics is important in this regard.

It has been stated that the day's milk from 48 quarters in the course of treatment with 25,000 units of penicillin is enough to inhibit the starter in a single 900-gallon vat. If 100,000-unit doses of penicillin are being used, the milk from about 16 quarters in the course of treatment is sufficient. Sometimes higher doses have been used. If 300,000 units of procaine penicillin are injected into infected quarters, the milk from two or three of these quarters at the next milking will inhibit starter in a 900-gallon vat.

The fact that the milk may be abnormal prevents its being sent to the factory during treatment. When the normal appearance of the milk is restored, however, it is advisable to remember how dangerous it can be, and Dr. Petersen's method of marking the treated quarter with tape should act as a jog to the memory as well as a means of identifying the dangerous quarter.

Milk from treated quarters should not be sent to the cheese factory for 4 milkings after treatment, and if the dose has been above 25,000 units of penicillin or one of the other antibiotics, it is advisable to hold back the milk for at least another milking.

In conclusion the facts to bear in mind are that a strip cup aids early detection of mastitis, that a good standard treatment is still 25,000 units of penicillin a day for 3 days, but lack of response to this should result in variation of treatment, and that on no account should milk from treated quarters be sent to a cheese factory less than 2 days after the last treatment.

"The Potato in Health and Disease": T. Whitehead, T. P. McIntosh, and W. M. Findlay

THE third edition of "The Potato in Health and Disease" has been revised and considerably enlarged. A new section of five chapters deals with the animal pests of the potato, a subject not covered in earlier editions. Additional chapters have also been added on potato breeding, potato machinery, the cooking quality of potatoes, and the relation between virus and plant. The chapters on potato diseases have been rearranged, and most chapters have been considerably increased in their contents.

What was said (in the "Journal of Agriculture" for February 1946) about the second edition of this book is even more true about the third edition. It is a very comprehensive work on the potato, both in health and when attacked by a multitude of pests and diseases, and is written in an easily readable form. Its specific references to British potato growing naturally limit but do not by any means destroy its value under New Zealand conditions.

In its expanded form the book is more than double its earlier size. The difficulty of handling a book of such size which is deserving of continual reference might be said to be its only weakness. Separate volumes, "The Potato in Health" and "The Potato in Disease", may be the answer.

—*J.H.C.*

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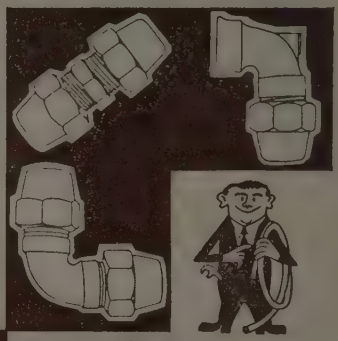

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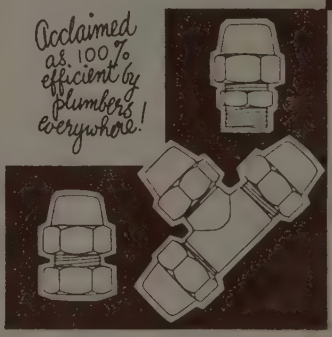

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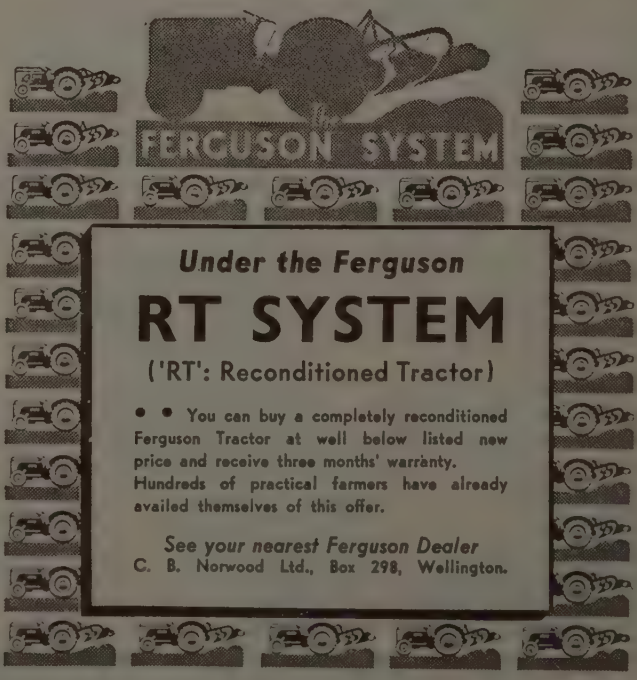

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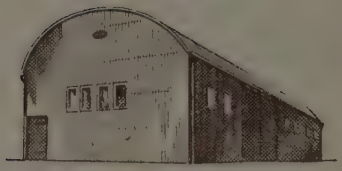

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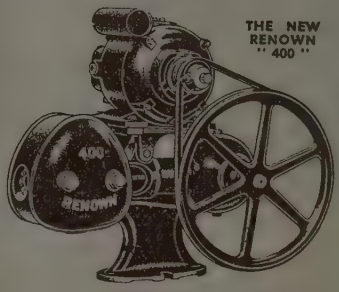

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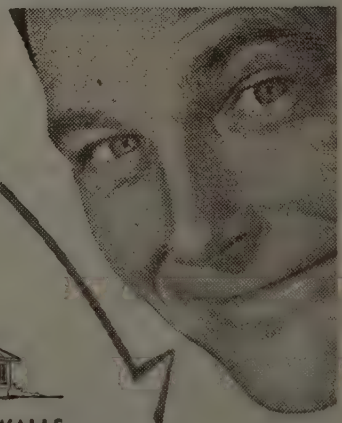

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stops. The whole cycle is resumed whenever the birds eat all the feed available, finally emptying the small trough and allowing it to rise.

The feed, which can be pellets, grain, or dry mash, travels along the feeder at approximately 8ft. per minute. This rate could be regulated a little slower, but the agitating motor would then be operating much more frequently. Small (1½in. diameter) wheels are placed at intervals of 8ft. along the trough, thus permitting the whole length of trough to vibrate smoothly on a strip of 2in. channel iron. There are also small guides on either side of the feeder to prevent the wheels coming off.

The height of the trough from the floor should be approximately 2ft. The one shown is only 1ft. and this height tends to entice the birds to lay under the trough. The trough is 4in. deep and 4in. wide.

The entire automatic feeder is driven by a ¾ h.p. electric motor. The trough in this instance is coupled to the gearing of a windmill by a piston connecting rod. This permits the feeder a movement of 1½in. forward and backward. -A strong concrete base is essential for the motor.

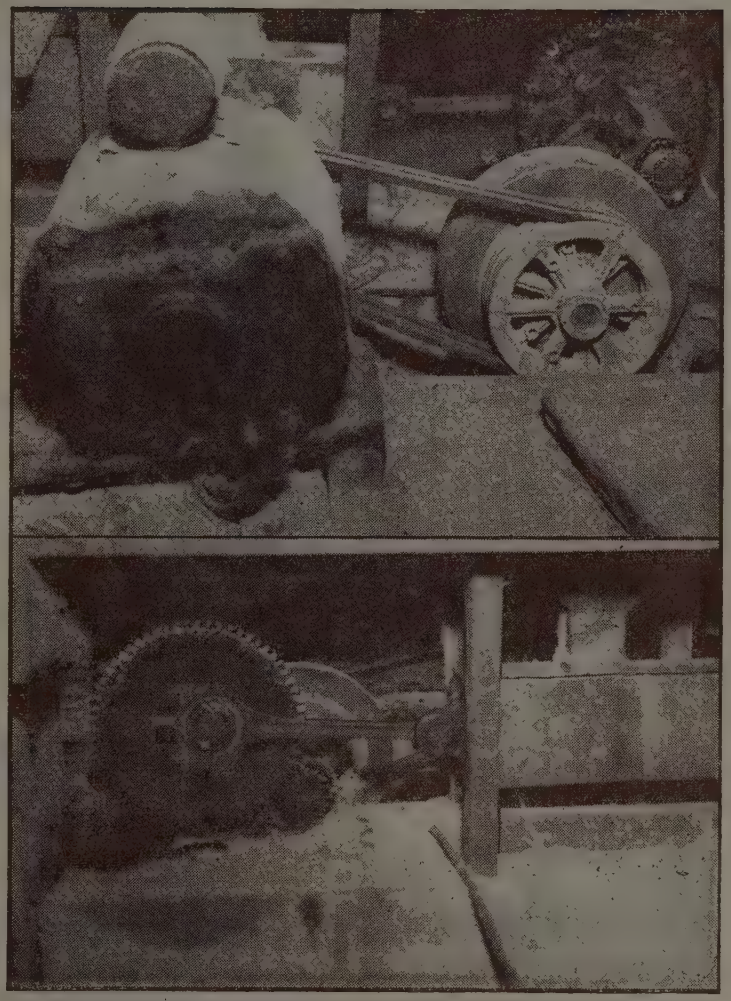
In this particular shed a large bin capable of holding 2 tons of pellets has been built over the motor. The bin, which is almost funnel shaped, has a short 3in. x 3in. steel chute feeding into the automatic feeding trough. Pellets and grain have been used successfully in this feeder and it is claimed that dry mash works equally well.

When pellets are fed ad lib. it is advisable to give a light scratch feed of grain each day. Pellets have a tendency to loosen the droppings with the result that the litter will soon cake if not turned over regularly. If wheat is fed free choice, some other grain such as maize could be fed into the litter to entice the birds to scratch.

One prominent poultry farmer in Gisborne allows the birds free-choice maize as their main diet, but a scratch grain of wheat to which has been added an appropriate amount of fish oil is fed each day. Whatever feeding system is adopted this automatic feeder will prove efficient on any large commercial farm.

Photographs by R. W. Orr.

AUTOMATIC POULTRY FEEDER



Upper—The motor, drive, and (at back) connection to the feeder. Lower—The piston connecting rod attached between the driving gear wheel and the feeder.

November Reminders for Household Poultry Keepers

ALL poultry including chicks and growing stock require vitamins A and D_3 and their supply by the inclusion of a fish oil in the feed is essential. One and a half tablespoons to each 10lb. of mash is adequate for chickens.

Extra care should be taken at this season to guard against body lice on birds and red mite under perches and fittings or in cracks and crevices in poultry houses. Information on the control of these external parasites is given in Department of Agriculture Bulletin No. 327, "Internal and External Parasites of Poultry", which is available free from offices of the Department.

New season's growing pullets should be kept separate from adult stock, as otherwise the young birds become bullied and timid and receive insufficient food to maintain satisfactory growth.

Application forms for the blood-testing of poultry against pullorum disease are available from offices of the Department of Agriculture in Auckland, Hamilton, Hastings, Wanganui, Levin, Wellington, Christchurch, Oamaru, and Dunedin. Applications should be completed without delay and returned with the necessary remittance to the nearest Departmental office listed.

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Gooseberries

By MAUD B. STRAIN,

Field Officer in Rural Sociology,
Department of Agriculture, Dunedin

WHERE the summer temperature is moderate and the winters are cold gooseberries bear prolifically, and how to use the surplus fruit is often a problem. Fortunately they are one of the easiest and most economical fruits to preserve, they make excellent jam and jelly, they can be bottled by any of the recognised methods, and they can be used for sauces and relishes. The fact that gooseberries have a high vitamin C content and retain this well when preserved makes them nutritionally a valuable article of diet during that time of the year when fresh fruit is scarce.

WHERE the climate is suitable gooseberries can be cultivated easily in the home garden and will provide an abundance of fruit with little attention. They bear fruit in their third year and will continue in full production for many years. There are green, red, white, and yellow varieties; some are larger than others and some are more suitable than others for dessert. Commercially there is little demand for dessert gooseberries and, except in the home garden where a specially good bush may be left for dessert, practically all gooseberries are picked and used green. The young fruit soon attain sufficient size for culinary use. Though not the first to ripen, the gooseberry is the earliest of the new season's fruit to be ready for use. The most satisfactory stage for harvesting is when the fruit has attained its full growth and flavour but is still green; at this stage it retains its shape and colour well.

Gooseberries are nutritionally valuable because they have a good vitamin C content; one average serving of cooked gooseberries will provide half the daily requirement of this vitamin for an adult.

Though vitamin C stands up well to the ordinary cooking processes, it can be destroyed by contact with copper. Therefore a copper or brass preserving pan should not be used for making jams and jellies or wherever the fruit comes directly in contact with the container. Also iron or badly chipped enamel utensils should be avoided, because fruit left in either of these may be spoilt in colour and flavour. Gooseberry jam and jelly are not difficult to make. They set easily because the fruit is rich in both pectin and acid, the two substances which combine with sugar to form jelly. For this reason and also because, though it is sharp in flavour, it has no very distinctive taste, gooseberry juice is a valuable source of pectin to add to fruits which are lacking in either or both of these two essentials. A certain amount of gooseberry juice, or gooseberries, mixed with the strawberries when strawberry jam is being made will have little effect on the flavour but will help considerably with the setting of the jam. Added to fruit containing little acid, gooseberry juice brings out the flavour of the fruit. The juice may be bottled and stored for use with later summer and autumn fruits.

Various Puddings

Fresh or bottled gooseberries are equally suitable for these recipes.

Stewed Bottled Gooseberries

To make stewed gooseberries with fruit bottled in water pour off the water and use some of it for making the syrup. Add sugar in the proportion of ½ cup of sugar to 1 cup of liquid and boil the mixture for 2 to 3 minutes; then add the gooseberries and simmer them gently for 1 to 2 minutes.

Gooseberry Fool

1lb. of gooseberries
4oz. of sugar
¼ pint of water
½ pint of cream (whipped) or custard
Sponge fingers (optional)

(Serves 4)

Put the sugar and water in a saucepan and heat them until the sugar is

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dissolved. Add the gooseberries and cook them gently until they are soft. Rub them through a sieve and add sugar to taste. When the mixture is quite cold mix it with stiffly whipped cream or custard. Pour the fool into custard glasses and garnish it with sponge fingers.

Gooseberry Whip

1 tablespoon of gelatine
½ gill of cold water
2 egg whites
2 cups of stewed gooseberries
6oz. of sugar
Juice of 1 lemon

Custard

2 egg yolks
½ pint of milk
2oz. of sugar

(Serves 4)

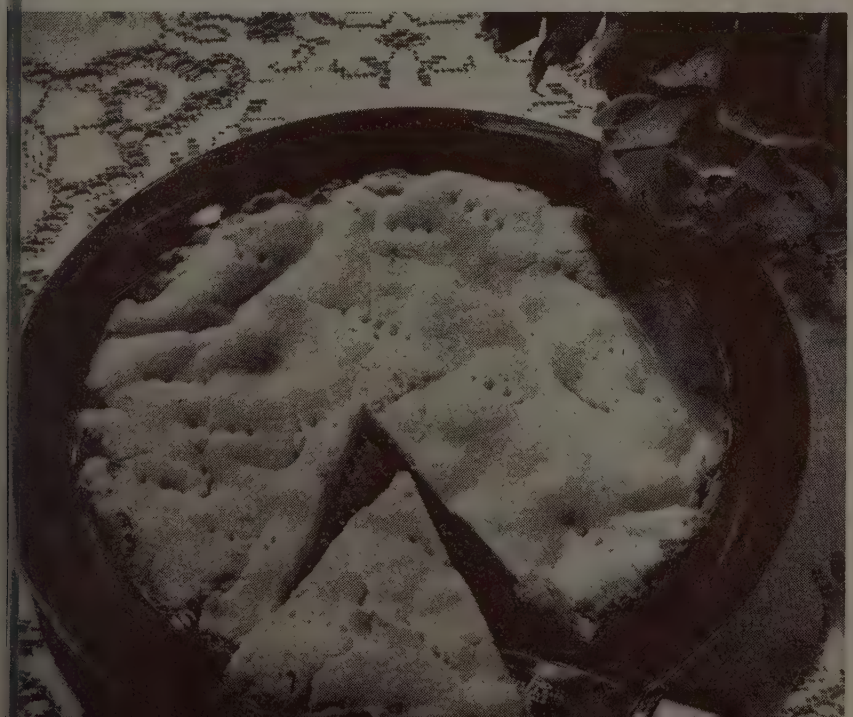
Soften the gelatine in the cold water for a few minutes. Add one cup of hot fruit juice to dissolve the gelatine. Add the sugar and stir until it has all dissolved. Allow this mixture to cool. When it shows signs of thickening whip it with a rotary beater. Whip the egg whites stiffly and stir them into the gelatine mixture. Stir in the remainder of the fruit and lemon juice and pile the mixture in a glass bowl or individual dishes. Serve with custard made from the egg yolks, milk, and sugar as follows: Beat the yolks slightly in the upper section of a double boiler, add the milk and sugar, and stir the mixture over boiling water until it coats the spoon.

Gooseberry Shortcake

Gooseberries
6oz. of flour
3oz. of butter
2oz. of sugar
1 egg
½ teaspoon of salt
1 teaspoon of baking powder
Milk as required

(Serves 4)

▲ Gooseberry whip garnished with whipped cream and decorettes.



▼ Gooseberry shortcake.

Cream the butter. Add the sugar and continue creaming this mixture. Beat the egg and add it to the creamed mixture with the flour sifted with the baking powder and salt to make a soft dough. If necessary, add a little milk. Butter and flour a 6in. sandwich tin and spread half the dough in the tin. Cover this with bottled gooseberries from which the liquid has been strained and place the other half of the shortcake dough on top. Bake the shortcake for 20 minutes in a moderate oven (350 degrees F.). Serve it with cream.

Iced Gooseberry Charlotte

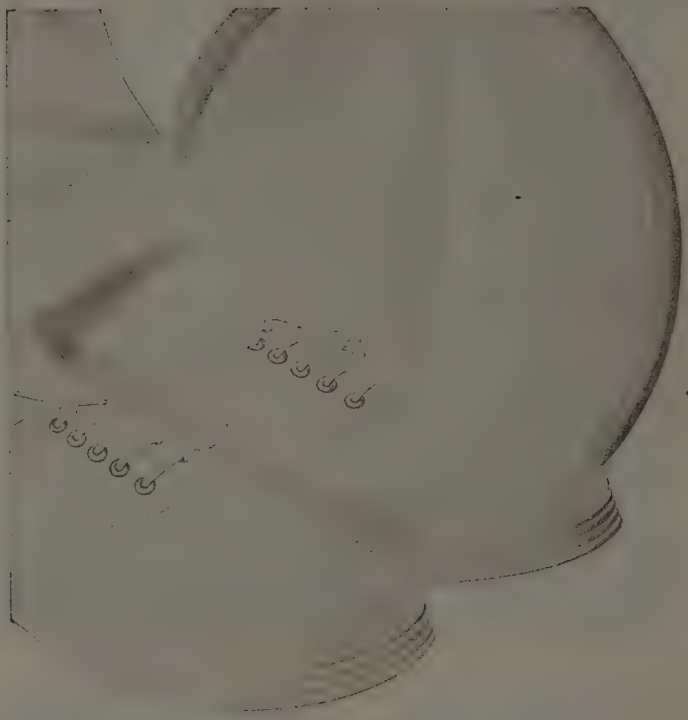
1lb. of gooseberries
6oz. of sugar
½ gill of water
Ice cream
Sponge fingers

(Serves 6)

Line a deep dish, or individual dishes if preferred, with split sponge fingers and three parts fill the dish with gooseberry puree made by stewing the gooseberries with the water and sugar and rubbing the mixture through a sieve. On top of the charlotte put ice cream.

Fruit Pies and Steamed Puddings

Fruit pies and steamed puddings are always popular. Gooseberries either fresh or bottled are suitable for both. They are also satisfactory for fruit sponges, but the gooseberries should be hot when the sponge mixture is poured on top.



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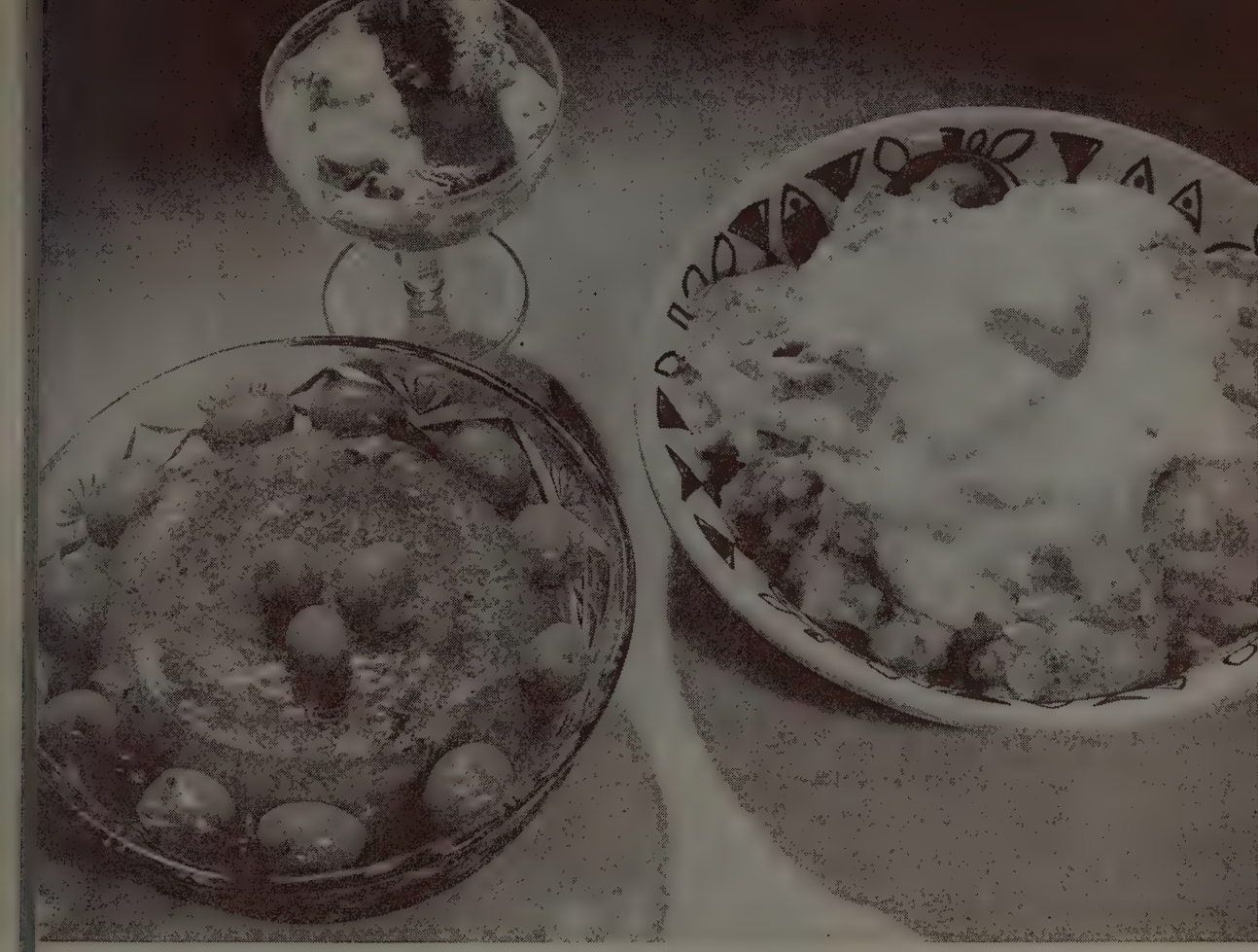


Desserts. Left—Gooseberry jelly. Upper left—Gooseberry fool. Right—Gooseberry and banana trifle topped with cream.

Sponge Crust

1 egg	6oz. of flour
4oz. of sugar	1 teaspoon of baking powder
2oz. of butter (melted)	½ teaspoon of salt
¼ cup of milk	

Beat the egg well, add the sugar, and beat the mixture until it is creamy. Add the melted butter and beat the mixture again. Add the milk and flour (sifted with the baking powder and salt) alternately to the sugar and egg mixture. Pour this over the hot fruit and bake the pudding in a moderate oven (350 degrees F.) for 45 to 60 minutes.

Gooseberry Meringue Tart

3oz. of butter	2 tablespoons of milk
4oz. of flour	½ teaspoon of salt
4oz. of cornflour	1 teaspoon of baking powder
1oz. of sugar	Stewed gooseberries
2 egg yolks	

Meringue

2 egg whites	4oz. of sugar

(Serves 6)

Cream the butter. Add the sugar and continue creaming. Sift together the flour, cornflour, salt, and baking powder. Beat the egg yolks and add the milk. Add this mixture to the creamed butter and sugar mixture with the sifted flour to make a soft dough. Line a 9in. oven-glass pie plate with this mixture and bake the dough in a moderate oven (350 degrees F.) for 15 minutes until it is a golden colour. Cool it slightly and fill it with stewed gooseberries from which the juice has been strained. Make a meringue by beating the egg whites stiffly and then folding in the sugar. Cover the gooseberries with the meringue. Put the tart in a cool oven (200 to 250 degrees F.) for ½ hour to set the meringue. Serve the tart with cream.

Gooseberry Closed Tart

Short pastry (about 12oz.)	Quart jar of bottled gooseberries or fresh gooseberries
Sugar to taste	

(Serves 6)

Line a 9in. oven-glass pie plate with short pastry. Strain off the liquid from a quart jar of preserved gooseberries and fill the pastry case with the fruit. Add sugar to taste. Cover the fruit with pastry and bake the tart in a hot oven (450 degrees F.) until the pastry is cooked and the fruit soft (20 to 30 minutes). Bottled gooseberries are excellent for this because they require much less cooking than does fresh fruit.

Gooseberries with Creme Chantilly

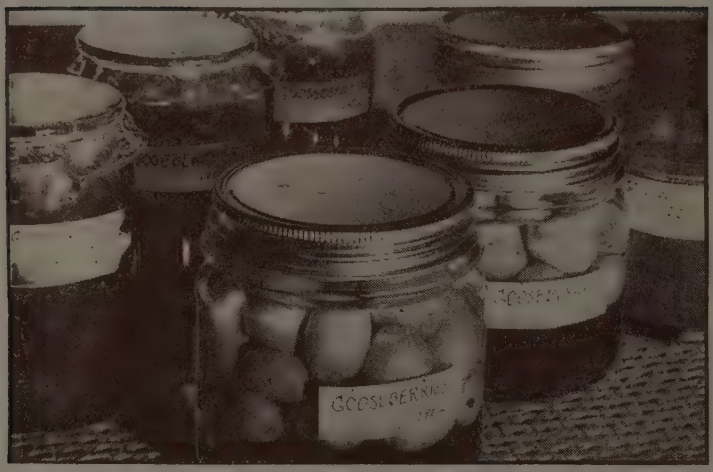
1lb. of gooseberries	½ gill of water
7oz. of castor sugar	¼ pint of cream

Put the prepared fruit in a small casserole with the water and sugar. Cover these with the lid and cook in the oven until the gooseberries are soft. Crush the fruit and let it go cold. Pour it into a glass dish and cover it with freshly whipped cream.

Gooseberry Bread Pudding

4oz. of gooseberries	2 eggs
½lb. of stale bread (no crust)	1 tablespoon of rum (optional)
1 pint of milk	3oz. of sugar

(Serves 4)



Bottled gooseberries, gooseberry jam, and gooseberry jelly.

Put the bread into a basin. Heat the milk to boiling point with the sugar and pour this over the bread and let the mixture stand for 10 minutes. Rub it through a sieve and mix it with the beaten egg, the fruit, and the rum. Make some caramel by melting and allowing to brown slightly 2oz. of sugar. Allow the caramel to run over the bottom and sides of a pie dish until the inside of the dish is covered. Pour the fruit mixture into the dish and bake it in a moderate oven (325 degrees F.) for 50 to 60 minutes. Serve the pudding cold with custard or cream.

Variation

Make the pudding, using the yolks only of the eggs. When the pudding is cooked spread it with any left-over stewed fruit or a thin layer of jam. Make a meringue by beating the whites of the eggs stiffly and folding in 4oz. of sugar. Pile the meringue on top of the pudding and harden it in a cool oven (200 to 250 degrees F.) until it is delicately brown (½ hour or longer).

Gooseberry and Banana Trifle

1lb. of gooseberries
4oz. of sugar
¼ gill of water
3 bananas
½ lemon
½ pint of custard
4 sponge fingers

(Serves 4 to 6)

Cook the gooseberries in the water until tender. Add the sugar and rub the fruit through a sieve. Make the custard and flavour it with the rind of the lemon. Cut the sponge fingers in halves horizontally and use half of them to line a glass dish. Spread the cake with the gooseberry puree and on this put banana mashed with a fork; squeeze lemon juice over the banana. Add another layer, using the remainder of the sponge cakes, puree, banana, and lemon juice and pour the warm custard over the top. Leave the trifle until cold and serve with whipped cream.

Gooseberry Jelly

1lb. of gooseberries
½ pint of water
3oz. of sugar
Packet of lemon jelly crystals

(Serves 4)

Boil the water and sugar briskly for 5 minutes. Add the gooseberries and cook until they are soft. Strain off the juice and use it for dissolving the jelly crystals. Rub the gooseberries through a sieve and add this puree to the juice. Turn the mixture into a mould and leave it to set. Unmould the jelly on to a glass dish and decorate it with whipped cream.

Gooseberry Cocktail

Juice of 1 lemon
2 cups of bottled gooseberries
Sugar to taste
Few raspberries or cherries to decorate

Rub the gooseberries through a sieve and sweeten the puree to taste. Add the strained lemon juice. Put the puree in sundae glasses, set a raspberry or cherry on top of each glass, and chill the pudding before serving. Frosting the rims of the glasses with coloured sugar gives a most attractive finish. This is done by brushing round the rims with white of egg and then dipping the rims into coloured sugar.

Jams and Jellies

Green Gooseberry Jam

6lb. of gooseberries
8lb. of sugar
3 pints of water

Put the prepared gooseberries into a preserving pan with the water and simmer them gently until the fruit is well broken up and the quantity reduced by about one quarter. Add the sugar and boil the mixture until a little poured from a metal spoon gives the sheeting test. Allow the jam to stand for a few minutes, then pour it into clean, warmed jars. Cover and label the jars.

Ripe Gooseberry Jam

3lb. of gooseberries
1 pint of water
3lb. of sugar

Place the prepared gooseberries in a preserving pan with the water and cook them until they are tender (about 20 minutes). Add the sugar and boil the mixture hard, stirring it frequently until the jam gives the setting test. Allow it to stand for a few minutes, then put it in clean, warmed jars. Cover the jars.

Gooseberry Jam (Green Colour)

4lb. of gooseberries
2 pints of water
6lb. of sugar

Use young gooseberries. Prepare the fruit and put it in a preserving pan with the water and simmer the mixture until the fruit is tender and broken (about 20 minutes). Add the sugar and heat the mixture gently without boiling until all the sugar is dissolved; then boil the mixture rapidly for 5 minutes. Leave the jam to cool slightly, then bottle, cover, and label it. If longer boiling time is given, the preserve will turn pink.

Gooseberry Jelly

6lb. of gooseberries (slightly under-ripe)
Sugar
Water

Put the prepared gooseberries in a preserving pan with sufficient water barely to cover them. Bring the mixture to boiling point and simmer until the fruit is soft and pulped. Stir occasionally to prevent scorching. Pour the pulp into a jelly bag and let the juice drip through. When the flow has almost stopped squeeze the bag to express the remaining juice. Strain the juice again through a clean jelly bag or collander lined with butter muslin to make it as clear as possible. Measure the juice and to each pint of juice allow a pint measure of sugar. Pour the juice into a preserving pan of sufficient size to allow the juice to froth up and boil rapidly without boiling over. When the juice reaches boiling point add the sugar and boil the mixture vigorously until a little gives the sheeting test. This point may be reached after 5 to 15 minutes' boiling. Pour the jelly into sterilised, warmed jars and cover the jars with transparent covers. Label the jars and store them in a cool, dry cupboard.

Gooseberry and Strawberry Jam 1

3lb. of strawberries
4lb. of gooseberries
10lb. of sugar
½ pint of water

Hull the strawberries and put them in a large basin. Weigh out 6lb. of sugar and put it over the strawberries and leave these overnight. Next day cook the gooseberries in the water until soft, stirring constantly to keep

the fruit from burning. Add the strawberry-sugar mixture and the remaining 4lb. of sugar and boil the jam until it gives the setting test. Pot, cover, and label the jam.

Gooseberry and Strawberry Jam 2

5lb. of gooseberries
2lb. of strawberries
5 cups of water
9lb. of sugar

Hull the strawberries and prepare the gooseberries. Boil the gooseberries in the water until soft (about 20 minutes), then add the sugar and strawberries, and boil the jam quickly until it sets.

Gooseberry and Pineapple Jam

6lb. of gooseberries
2 large tins of crushed pineapple
9lb. of sugar
Water to make 3 pints

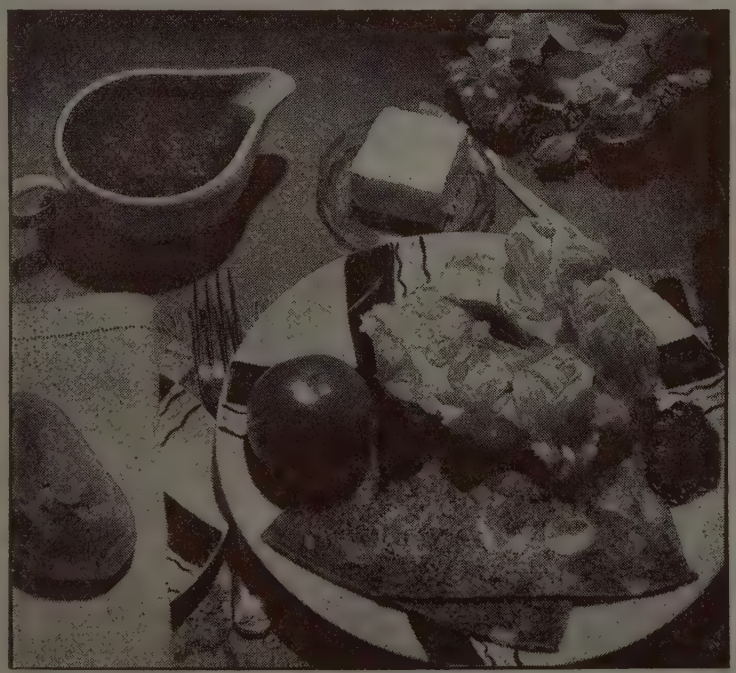
Prepare the gooseberries and put them in the preserving pan. Strain the juice from the pineapple, measure the quantity, and add water to make 3 pints altogether. Boil the gooseberries in this liquid until they are soft (20 to 30 minutes). Add the sugar and pineapple and boil the jam until it gives the setting test. Pour it into clean, warmed jars. Cover and label the jars.

Green Gooseberry Marmalade

6lb. of gooseberries
11lb. of sugar
4 lemons
5 pints of water

Slice the lemons finely and put them with the prepared gooseberries and the water into a preserving pan. Boil these for 1 hour, stirring them frequently. Add the sugar and boil the mixture until it gives the sheeting test. Pour the marmalade into clean, warmed jars and cover the jars with transparent cellulose covers.

Ingredients for making gooseberry sauce.



A cold meat meal is more appetising when accompanied by a well-flavoured, home-made preserve such as gooseberry chutney.

Pickles, Sauces, and Chutneys

Gooseberry Pickle

5lb. of under-ripe gooseberries
1 pint of vinegar
½ tablespoon of allspice
4lb. of sugar
1 tablespoon of cinnamon
½ tablespoon of cloves

Wash the gooseberries and remove the stem and flower ends. Put all the other ingredients into a saucepan and bring them to boiling point. Add the fruit and boil the pickle slowly for 15 to 20 minutes. Pack it into clean, warmed jars and seal the jars when they are cold.

Green Gooseberry Relish

2lb. of gooseberries
1lb. of onions
1 dessertspoon of black pepper
1 tablespoon of curry powder
1lb. of sugar
1 tablespoon of ground ginger
3 pints of vinegar
1 tablespoon of salt

Wash the gooseberries and peel the onions. Mince the gooseberries and onions and put them into a saucepan with the rest of the ingredients. Boil the mixture gently until the onions are tender. If necessary, thicken the relish with a paste made from 2 tablespoons of flour mixed with a little water. Pack the relish into hot, sterilised bottles and cover the tops

of the bottles with melted paraffin wax.

Gooseberry Chutney 1

Mince or chop all the ingredients and allow long, slow cooking. This helps to give the mellow flavour a good chutney should have.

3lb. of gooseberries
3 medium onions
½lb. of dried fruit (sultanas, dates, or figs)
½lb. of sugar
1½ pints of vinegar
1 dessertspoon of mustard
1 teaspoon of turmeric
1 teaspoon of ginger
½ teaspoon of ground nutmeg
Few shakes of cayenne pepper
Salt to taste

Prepare the gooseberries and put them through the mincer with the onions and dried fruit. Add the sugar and vinegar. Bring the mixture gently to boiling point and cook it to a pulp, adding salt to taste. Add the ginger, nutmeg, and cayenne pepper. Mix the mustard and turmeric with a little cold vinegar to a smooth paste and stir this into the mixture. Cook the mixture until it is thick (usually about 2 hours). Pack the chutney into sterilised jars. Seal the jars with paraffin wax and cover them when they are cold.

Gooseberry Chutney 2

3lb. of gooseberries
½lb. of chopped prunes
4 onions
1lb. of brown sugar
½ teaspoon of turmeric
½oz. of crushed mustard seed
½ teaspoon of cayenne pepper
2 tablespoons of salt
1½ pints of vinegar

Mince or chop the gooseberries, prunes, and onions. Put all the dry ingredients into a preserving pan and cover them with the vinegar. Bring these slowly to boiling point and continue cooking the mixture gently until it is well blended and pulped. It may be necessary to add more vinegar as cooking progresses. Cooking time is 2 to 3 hours. Pack the chutney into hot jars and seal the jars.

Gooseberry and Rhubarb Chutney

1lb. of green gooseberries
1lb. of rhubarb
1 quart of vinegar
1lb. of sultanas
2lb. of brown sugar
2oz. of ground ginger
½oz. of cayenne pepper

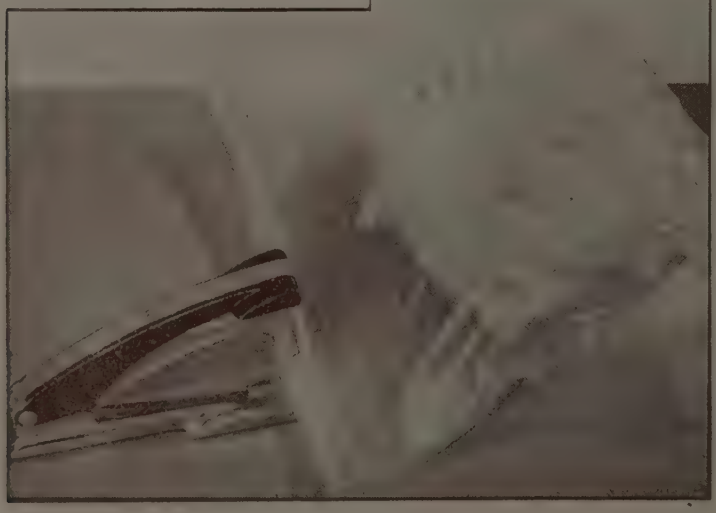
Prepare the gooseberries and chop them up or put them through a mincer. Cut the rhubarb into ½in. lengths. Put these into a preserving pan with the vinegar and cook them until they are soft. Chop the sultanas finely and add them with the sugar, cayenne pepper, and ginger to the vinegar mixture and cook the chutney slowly until it thickens (about 1½ hours), stirring it frequently to prevent it sticking. Pack the chutney into hot, sterilised jars. Seal the jars with paraffin wax and cover them when they are cold.

Household Uses of Staplers

THE stapler is more apt to be regarded as a piece of office equipment than as a useful gadget to have in the kitchen, yet besides its conventional office uses it will do many "tack and hammer" jobs in the home just as efficiently and in half the time as will these tools and with perfect safety.

Following are some suggestions for making full use of this gadget.

It is ideal for quick, light tacking jobs such as labelling a case of fruit, re-attaching loose window blinds to their rollers, or tacking on new ones (see illustration at right). It simplifies the recovering of slip seats in dining chairs or attaching tie backs for curtains to window frames, and it may be used for attaching lining to shelves drawers, and cupboards. The staples are easily removed, too.



It is useful for fixing wire mesh window or door screens or for attaching new screening to keep out wasps.

It will also help simplify the gift wrapping problems at Christmas. Small cardboard boxes can be tailored to fit awkwardly shaped gifts and stapled together in a few moments, glue or paste thus being unnecessary.

It is useful for quick sealing of plastic bags for freezers or refrigerators, as if the ends of the bags are turned over three of four times before they are stapled, the food is well sealed for temporary storage (see illustration at left). For this, the type of stapler which turns the ends of the staples out is recommended, as the staples are easily removed without damaging the bag.

—EVELYN E. MOORE,
Field Officer in Rural Sociology,
Department of Agriculture,
Palmerston North

Orchids for Beginners

A REMARK often heard among orchid growers is that anyone can grow orchids but few can flower them successfully. Beginners frequently buy orchid plants which, in spite of wrong treatment and sometimes neglect, remain alive and produce vegetative growth each year but never flower. The hardier orchids are not difficult to grow and their culture is well within the ability of the keen home gardener, but to appreciate their needs it is helpful to have a little knowledge of their habitat and the manner in which they grow, for they require treatment very different from that given to the average plants of the garden or glasshouse. This article by J. S. Say, Horticulturist, Department of Agriculture, Auckland, gives beginners some basic information which will help them over the first difficulties and introduce them to a very interesting hobby. The section on work in the flower garden in December is by K. H. Marcussen, Horticulturist, Department of Agriculture, Christchurch.

THOUGH generally associated with the tropics, orchids are of world-wide distribution, the polar regions and the great deserts being the only places where they are not found. New Zealand has about 40 species out of a world total of some 15,000. Only one species of orchid, the Vanilla from Mexico, is of any commercial value, but many are grown for their unusual and striking flowers. These are mainly from the tropical areas of Asia and America. Not all are from the hot, moist jungles, for many come from the colder parts high up in the mountains within these areas and it is with this group that the amateur is mainly concerned when he first ventures into orchid growing.

The temperature in these places often falls to 40 degrees F. and sometimes to freezing point. There is a definite wet season when most of the orchids make their growth, but no pronounced dry period, for showers and heavy mists are frequent during the remainder of the year. From this can be deduced three points which are important in the cultivation of this group of orchids, namely that they will stand fairly cool temperatures, that they require plenty of water at certain periods of the year but should never be dried right off, and that a fairly high atmospheric humidity is desirable.

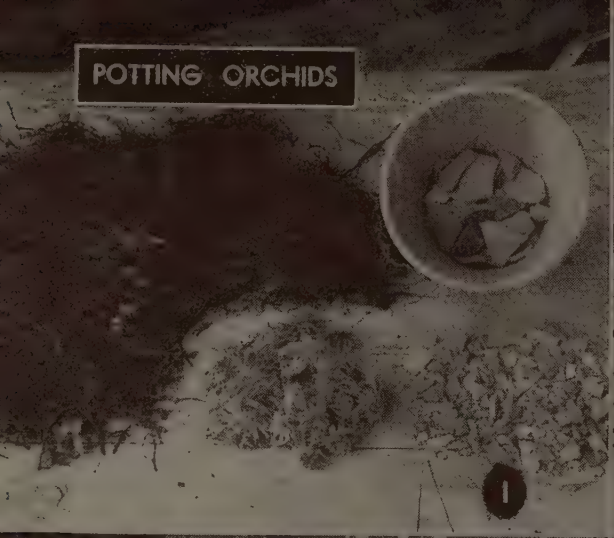
Growth Habit

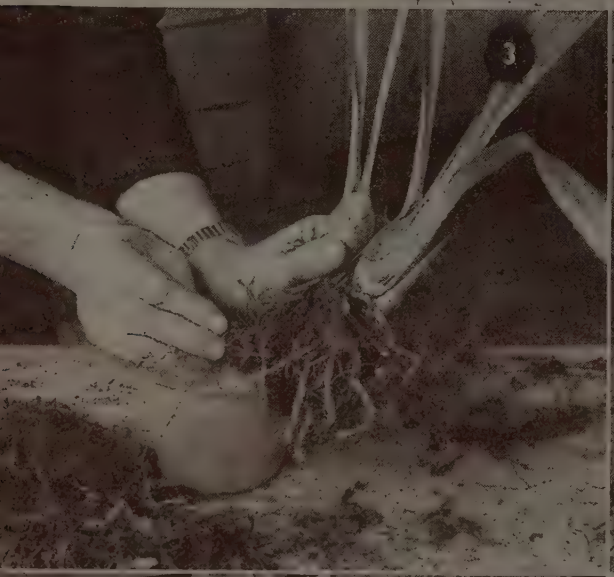
An important way in which orchids are classified is by their growth habit, and a knowledge of this is necessary to a full understanding of the method of potting and the composts used to grow them in. Orchids fall into two broad groups, epiphytic and terrestrial.

Epiphytes or "tree dwellers" are found on trees and sometimes rocks, but do not get any nourishment from their hosts, as they are not parasitic. Some of the roots cling tightly to the bark or spread through the litter which collects in the forks of their host trees, holding the plant

HEADING PHOTOGRAPH: A group of easily grown orchids. *Cypripedium insigne* on left and a newer hybrid on the right. Cymbidiums are in the centre, with a modern hybrid at the top. Sparrow photograph.

POTTING ORCHIDS





1—The materials ready for potting cymbidiums. The mixture comprises todea fibre, dicksonia fibre, and leafy material from the bases of astelia plants, fresh green tips of sphagnum moss, and small pieces of broken pots. The pot is crocked to a third of its depth for drainage. 2—Centre back: A cymbidium badly in need of attention. Left: A similar plant broken up, showing (on right) a piece ready for potting with the dead and broken roots removed and the old sheaths pulled off the pseudo-bulbs. Front: An old pseudo-bulb cleaned ready for propagation and the tools necessary for potting orchids. 3—Plant shown on right of previous illustration with the compost being worked round and between the roots to form a ball. 4—The ball placed in the pot and more material being levered in. The old pseudo-bulb is at the side of the pot with the new shoot toward the centre to allow 2 years' growth. The plant is set level with the top of the pot. 5—Centre: The potting completed with the tightly packed compost neatly trimmed. Centre front: A pseudo-bulb with new roots and shoot ready for potting. Right: A similar plant potted up with a wire holding it firmly in place. Left: A plant about 2½ years after potting up. The original pseudo-bulb has been removed and the plant now needs potting on, as there is no room for another year's growth. Photographs by Sparrow.

[*Sparrow* [*Elliott*

Left—*Dendrobium nobile* growing in a basket made from ½in. x ½in. hardwood. Right—*Cypripedium charlesworthi*.

firmly in place and obtaining nourishment from the litter; others are long and trailing. The roots of epiphytic orchids are capable of absorbing large amounts of moisture directly from the atmosphere through a greenish-white spongy layer surrounding the tough central core of the root proper. Root hairs, which in a normal plant absorb moisture and dissolved mineral salts from the soil, are not produced. Orchids in this group are mostly from the tropical jungles where atmospheric humidity is high and are cultivated mainly by specialists who have heated glasshouses where suitable conditions can be maintained.

Terrestrial orchids or "earth dwellers" live like ordinary plants and grow in the soil. The majority of these do not have showy flowers and are not extensively cultivated.

Between these extremes are two groups which have features common to both and may be called semi-epiphytic and semi-terrestrial. These two sub-groups are most important to amateur growers, as they provide most of the hardiest and most easily grown orchids. Some have a root system that is partly in the soil medium and partly out of it. Others grow in such places as the forks of trees and obtain their nourishment from the decaying vegetable and animal matter and dust which lodges there. The root structure of these two groups is very similar to that of epiphytes. It follows that when these orchids are grown a compost must be provided that is light, open, and very well drained so that there is a free circulation of air about the roots.

Orchids are also classified by the manner in which they make their vegetative growth. Due to unfavourable growing conditions at certain periods of the year many orchids, particularly the epiphytic and semi-epiphytic, have developed special food storage areas, usually in the stems. These thickened stems are called pseudo-bulbs, which should not be confused with true bulbs such as those of the narcissus family. Cymbidiums are an example of this type. A new growth arises from the base of the old pseudo-bulb each year in spring. At first this appears as a tuft of leaves, but by the end of the season the stem has thickened into another pseudo-bulb with the leaves on top. After about 3 years the old pseudo-bulb loses the leaves and roots and will remain in this dormant state for a number of years.

Slipper orchids also produce new growths from the bases of the old each year, but, unlike cymbidiums, they do not form pseudo-bulbs. This type of growth where the plant extends by prostrate rhizomes from which arise pseudo-bulbs, leaves, and roots has an important bearing on the time an orchid can be left without breaking it up and repotting. Old cymbidiums become a mass of pseudo-bulbs which do not give the young growths room to develop. Similarly old cypripediums become crowded with exhausted non-flowering growths. As a rule repotting is necessary before this stage is reached, because the plant declines in vigour due to the breakdown of the compost. This method of growth also has a bearing on the position in which orchids are placed in the pot when they are being potted.

Some of the epiphytic orchids grow in a totally different manner. The stem extends indefinitely in a vertical direction by developing fresh leaves from the apex and roots are formed at intervals along the stem. There is no pronounced growing season. The crucifix orchid is the only one of this type that the beginner is likely to grow.

Potting Composts

To grow orchids successfully it is important to provide a compost which has physical properties resembling those found in the natural condition. A mixture of leaves and other material found in forks of trees and on a forest floor is not suitable for plants under cultivation, as it decomposes too quickly. The roots, confined within a pot, cannot extend freely into new material and frequent repotting and potting on as with a normal pot plant are harmful to orchids because of the amount of root damage that usually occurs. An orchid is normally expected to remain in the same container for at least 3 years and any material used must be able to last for this period without decomposing to any great extent. Once decomposition sets in the compost soon becomes a soggy mass which prevents drainage and the free circulation of air necessary for healthy root growth.

The basis of most orchid composts is some form of fibre. Overseas, osmunda is used almost exclusively, but as this is unobtainable here, a

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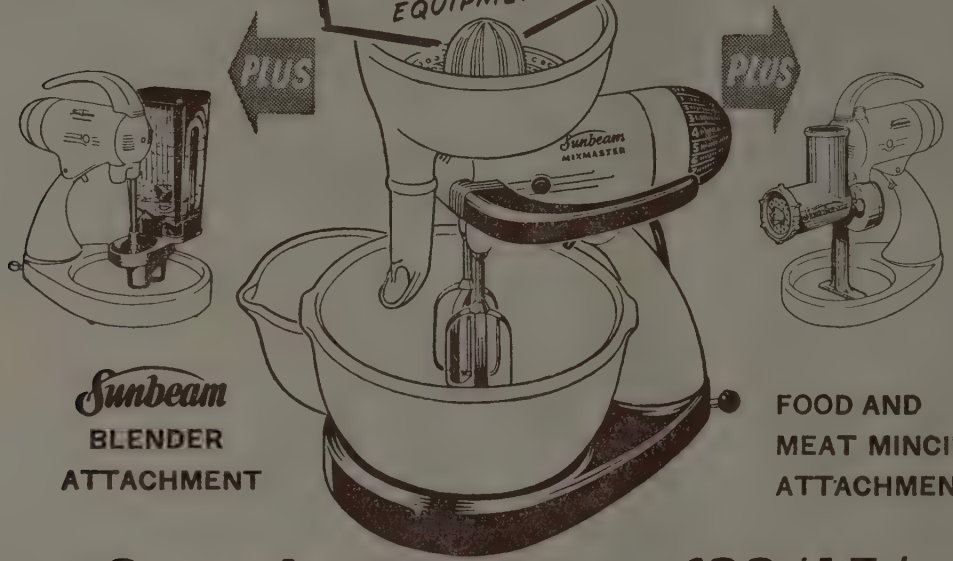

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locally grown substitute is necessary. The most satisfactory of these is the fibrous mass of roots from the bases of old plants of *Todea superba* (Prince of Wales Feather fern), for it is thin and wiry and will remain in good condition for at least 3 years. The fibrous roots about the trunk and at the base of *Dicksonia fibrosa*, one of the native tree ferns (weki-ponga), are also suitable. Another fibre that is sometimes used, though it is not as good as either todea or dicksonia, is the fibrous mass of rhizomes of *Carex secta*, the niggerhead of swamps. Its disadvantage is that it holds too much moisture and tends to rot down very quickly unless care is taken when watering. Dicksonia also tends to hold excessive moisture.

From this it will be seen that the fibre used in any potting mixture has a great influence on the frequency of watering. Those who are living in districts where these plants do not grow may have difficulty in obtaining suitable fibre, but it is available on the market. Growers would be well advised to get it in spite of the trouble that this may entail, for satisfactory results cannot be obtained otherwise.

To prepare the fibre for making a potting compost it should be chopped into pieces about the size of a matchbox and teased out. Dust and fine materials which fall out should be discarded.

Other materials are also needed. Sphagnum moss is used in some mixtures and should be fresh, preferably with some green tips showing. Old, brown, dried-out moss is not suitable. To prepare it it should be pulled apart into small pieces and any sticks, roots, and fine material discarded.

The leafy rubbish on the floor of the bush from about astelia (often incorrectly called kie-kie) plants is useful provided it has not rotted down. All dust and fine material should be discarded. Turf fibre from browntop and paspalum pastures is frequently used. The turf should be cut in pieces about 1ft. square and 2in. thick and stacked grass-side down for several months. Only the fibrous roots should be used and not the soil, which should be sieved out. Care should be taken not to use any live roots in the potting mixture. Leafmould is not satisfactory and should not be used if astelia is available. If leafmould is used, it should be only slightly rotted down.

A small amount of gravel, scoria, broken brick, or broken flower pot is also used to promote free drainage. Pieces should be about ¼in. in diameter. Crocks (pieces of broken pot) are needed for drainage in the bottom of the pot. The compost is usually used dry and the plants given a watering after potting.

Ordinary clay flower pots are most suitable for the majority of orchids. Some of the epiphytic types are better in wooden baskets.

[*Elliott*

A good display of slipper orchids in the glasshouse of an amateur grower.

Culture

Cymbidiums

Cymbidiums are one of the most popular of the hardy orchids and are probably the easiest for beginners to grow. The long sprays of flowers are produced in spring and last for many weeks. These are one of the groups of the semi-terrestrial orchids from the mountainous areas of tropical Asia and grow naturally in the decaying material in forks of trees and on a forest floor where they get the dappled shade from fairly open trees. They will stand temperatures almost down to freezing point without any severe damage, but a minimum of 40 degrees to 45 degrees is better.

From early summer to mid-autumn while they are in active growth they can be watered freely. Water should be applied over the rim of the pot and should drain away almost immediately if the compost is in good condition. No rules can be given as to how much or how often water should be given, as this varies according to the individual plant, the compost, and the conditions under which plants are grown. Some composts such as those made of carex hold more moisture than others and therefore do not have to be watered so often. Retentive composts of this nature are not desirable, as they do not encourage vigorous root action and rot down very quickly.

During hot weather the pots dry out more quickly and so more frequent watering is needed. With a little experience growers should be able to tell when water is needed by the feel of the pot. Some judge by the weight and others by the dampness. Orchids should never be allowed to stand in saucers of water. Watering should be gradually eased off in autumn, and during winter only enough should be given to prevent the pseudo-bulbs from shrivelling. Slight shrivelling does not harm them and it is always better to under water than over water at this time. An orchid grower's maxim is "when in doubt do not water".

In summer overhead spraying with water a couple of times a day is advisable, as it helps to keep the atmosphere about the plant humid. Overhead spraying consists of damping the leaves only and should not be confused with watering. A syringe or even a clean domestic fly spray reserved for the purpose can be used

where only a few orchids are grown. High summer temperatures are not harmful provided that humidity is high also, but it should be remembered that as temperature rises humidity drops. To counteract this the benches and floors should be kept wet during hot weather.

Shading is necessary in summer to cut down the direct sunlight and to prevent the glasshouse from becoming too hot and dry. In winter very light shade is beneficial in Auckland and further north.

Potting, when it becomes necessary, is done in spring just as the green root tips start to show. Flowering plants must be left until later, but should be done immediately the flower fades. A suitable mixture is 2 parts of dicksonia fibre, 1 part of todea fibre, and 2 parts of bush leafmould. Some growers also add 1 part of paspalum fibre, though this is not generally recommended. When todea cannot be obtained an extra part of dicksonia may be used.

The choice of a suitable-sized pot is often difficult for beginners and there is always a tendency to use one which is too large. The pot should be just large enough to take 2 years' growth. For a young plant with one old pseudo-bulb and one active young shoot a 4in. pot is suitable. One-third of the pot should always be filled with crocks to give free drainage. A potting stick will be necessary. Any firm stick about ½in. thick, 1in. wide, and 9in. long tapered to a flat point will do.

The terms potting up, potting on, and repotting are confusing and in the handling of orchids they should be understood, for slightly different methods are used in each case. Potting up means the potting of a small plant which has not previously been in a pot. Potting on is moving a plant into a larger pot and is done when a plant has filled the pot with roots. It is carried out only when the roots are healthy and the compost is still in good condition and is likely to remain so for a couple of years. Repotting means taking a plant from a pot, breaking it up if necessary, and removing the old compost and decayed roots. Repotted plants are usually replaced in pots smaller than the ones from which they were removed, because they are reduced in size in the process.

The best way to pot a cymbidium with a few roots is to take the plant and work some of the prepared compost in between and around the roots to form a fairly tight ball. This ball of compost and roots is then placed in the pot so that the base of the pseudo-bulb is level with the top of the pot. It may be necessary to place some of the compost over the crocks first to bring the plant up to the correct level.

The old pseudo-bulb should be placed to the side of the pot with the young growth pointing toward the centre so that as the new pseudo-bulbs are formed they will be able to root into the compost. The next step is to place some compost in the pot and slide the potting stick down inside the pot and lever the compost downward and inward about the ball of roots. This is repeated until the pot is full.

The compost should be compacted evenly through the pot and should not form into layers. The surface can then be trimmed with an old pair of scissors to make it neat. A little gravel or similar material should be sprinkled in as work proceeds. Two points must be watched. The roots, particularly the green growing tips, must not be broken or damaged, and the compost should be firm.

When a plant has to be potted on it is taken out of the old pot with as little disturbance as possible and placed in a larger one at the correct level. The compost is then packed firmly about the plant. The plant should be potted in this way only when the root system is healthy and the compost in good condition. It may be necessary to run an old table knife round the inside of the pot if there is any difficulty in removing the plant.

Repotting old cymbidiums is more complicated and is usually done when the compost is in poor condition or when the plant has reached a stage that makes potting on impracticable because of the size of the pot that would be needed.

When it is removed from the pot all the old compost should be shaken out or picked out with a sharp stick and old dead, damaged, or unhealthy roots cut off. It is better to divide up old plants than to repot them with perhaps a number of dormant pseudo-bulbs still attached.

The pieces for potting should consist of the new shoot together with one or two old pseudo-bulbs and should be cut from the plant with a sharp knife. These should then be potted in the manner already described.

Sometimes it will be found that the roots remaining are not sufficient to hold the plant steady in the new pot. In this case it is advisable to peg the plant down with a couple of "hair-pins" made of copper wire for preference. These should be placed over the rhizome between the pseudo-bulbs and firmly pushed into the compost.

New plants can be propagated from any surplus pseudo-bulbs simply by standing them on damp sphagnum moss in a warm place. Only the base of the pseudo-bulb should be in the moss. Roots and shoots will appear from this area. The new plant can be potted up as soon as the roots start to form. In this case potting consists of setting the plant on the compost in a 3in. or 4in. pot and holding it firm by placing a piece of bent wire over the pseudo-bulb.

A new plant grown from a dormant pseudo-bulb should flower in 3 or 4 years from the time of potting up. An old plant divided and repotted with two old pseudo-bulbs and a young shoot normally flowers within 3 years. If longer times are taken, it is likely that growing conditions or cultural practices have been unsatisfactory.

Cypripediums

Cypripediums are popularly known as slipper orchids and flower in winter and spring. Their treatment and potting are very similar to that of cymbidiums except that they like a little more shade during summer and warmer conditions during winter. Care should be taken not to water or give any overhead spraying late in the afternoon from mid-autumn to mid-spring, as water lodging at the bases of the leaves may cause rotting. Only sufficient water should be given during winter to keep the leaves firm and glossy.

The correct botanical name for cultivated slipper orchids is *Paphiopedalum*, though they are still commonly called cypripediums by gardeners. The true cypripediums are terrestrial orchids of Europe and America, and the paphiopedalums are semi-terrestrial and come from the cooler parts of tropical Asia. When slippers are being bought it is as well to avoid any with mottled leaves, as these are from warmer areas and require more heat during winter and are not so easy to grow.

Epidendrums

Crucifix orchids are epiphytes or semi-epiphytes from central America and will grow well under the same conditions as cymbidiums. The two hardiest species are *E. boundi* and *E. obrienianum*, which produce clusters of cross-shaped flowers about 1in. across. They can be planted in the mixture recommended for cymbidiums. The thin growth from which aerial roots arise will need staking, or they can be grown against a slab cut from a punga trunk. A piece of punga about 2ft. long and 3in. or 4in. wide and 2in. thick should be placed in the side of the pot and then the plant potted into the compost in the normal way. As the shoot grows the aerial roots arising from the stem will take hold of the punga.

Dendrobium

D. nobile is another orchid which can be grown under conditions similar to those required for cypripediums or cymbidiums, though it does better if winter temperatures can be maintained a little higher. A true epiphyte from the Himalayas and China it produces sprays of pinkish-white flowers

with a purple marking in the throat in spring. Some of the varieties have slightly different colour combinations. Though they are not difficult to grow, a beginner would be advised to get a little experience with some of the other orchids first.

D. nobile can be grown in a pot, but it is better in a wooden basket hung from the rafters in the warmest part of the glasshouse. Being an epiphyte it likes a very light open rooting medium, a mixture of 3 parts of todea and 1 part of fresh sphagnum moss being most satisfactory. During summer when it is in full growth plenty of water is needed, but in autumn as soon as the growth is mature water should only be given when the pseudo-bulbs commence to shrivel. This is most important, as if too much water is given at this time and through early winter, flowers will not be produced.

In July small shoots should appear in the pseudo-bulbs. If conditions have been correct during the previous season, these will be flower buds, but if not they will be growth shoots. Water should not be given until the flower buds are well formed and then it can be given freely again. As soon as it is seen that the growths are only leaf shoots and not buds water can be given. These young growths can be cut off and used as new plants.

As it is rather difficult to get the compost in a basket thoroughly wet by watering with a can, it is best to dip the basket in a bucket of water for a few minutes. During the period when little water is needed it is sufficient to dip the basket in and straight out again.

Bletia

Bletia hyacinthina (syn. *Bletilla hyacinthina*) from the woodlands of Japan is one of the few truly terrestrial orchids grown in cultivation. It forms a rosette of leaves from which arise spikes of rosy-purple flowers 12in. to 18in. high. In winter all the top growth dies off to a tuber-like pseudo-bulb just below the surface of the soil. Bletia is hardy and can be grown outside in areas not subject to very severe frosts in a semi-shaded position where the soil is moist in summer and contains plenty of leafmould. When it is grown in pots a compost of 2 parts of leafmould, 2 parts of dicksonia fibre, and 1 part of soil is suitable. Shade and plenty of water are needed in summer. Repotting, when it becomes necessary, should be done just as growth commences in spring.

Glasshouses

In the warmer parts of the country cymbidiums and epidendrums can be grown in the open, but in general better results are obtained in a glasshouse. In frosty districts a glasshouse with a heating system capable of keeping out the frost is essential. If the minimum temperature can be kept up to 40 degrees F., so much the better.

[*Elliott*

A crucifix orchid (*Epidendrum boundi*).

As most orchids like free circulation of air about them during summer, ventilators are necessary at the top and in the sides. The latter should be under the benches so that draughts do not blow directly on to the plants. To cut down the light intensity and heat during summer some form of shading is necessary. Scrim or hessian blinds which can be rolled up or down according to the weather are good. If some form of lime wash is used on the glass, only a thin coat should be given in late spring and a heavier one during summer. As a rule shading of this type gradually washes off as the season advances, allowing more light to enter in late autumn and winter. Usually no shading is required during winter in districts south of Auckland.

Among the conditions mentioned as being necessary for successful orchid growing are free circulation of air and a high humidity during summer. At first sight it may seem to be impossible to have both, but suitable benches combined with damping down will go a long way toward keeping up the humidity. The ideal bench for an orchid house is one constructed of wooden battens about 6in. above a solid bench covered with scoria, gravel, or sphagnum moss, all of which retain considerable moisture. It also helps if only the paths are concreted, leaving the space under the benches open to grow ferns, selaginella, and Rex begonias, all of which do well in moist, shady positions.

Gardeners who have a glasshouse or are thinking of building one but who do not wish to devote the entire house to orchids will find that they can grow a number of pot plants quite well under the conditions demanded by the orchids. These include tuberous, Rex, and "tree" type begonias, maidenhair fern, cyclamen, gloxinia, and streptocarpus.

All of the orchids mentioned, with the possible exception of dendrobium, are cultivated by many people very successfully on verandas and sunporches. It is more difficult to maintain suitable conditions in such places, but it can be done. The main points to watch are temperature (summer and winter), light intensity (not too much shade or sun), draughts, and humidity. Generally, orchids do not do very well in a room, as good growing conditions are more difficult to maintain, but it does not harm the plants to bring them in while they are in flower, provided they are not in draughts, receive a fair amount of light, and are not placed near fires.

In the warmer parts of New Zealand cymbidiums can be grown very well outside in a sheltered position where they receive some shade during the hot part of the day in summer. They do very well in bush houses where they receive protection from wind and strong sun and where it is fairly easy to maintain suitable growing conditions. During the flowering period

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it is advisable to bring them under cover, as the flowers are easily damaged by rain.

Pests and Diseases

Orchids are seldom affected by serious diseases. Root rots, usually caused by over-watering in winter or unsuitable composts, are the most serious. This condition is usually first shown by a general unhealthy appearance and stunted growth.

Aphides and scales are the most troublesome of the pests. The former usually attack the flowering spikes of cymbidiums and are best controlled with a nicotine sulphate spray. Scales are often found on the leaves, particularly toward the bases in cymbidiums. A great deal can be done to reduce attacks by pulling off the old sheaths from the cymbidium pseudo-bulbs, as these make ideal breeding places. Where scales are present on the leaves they should be sponged with summer oil (1 dessertspoon to the gallon). A brush with a tuft of stiff hairs, dipped in the spray, is handy for getting rid of scales at the bases of the leaves.

Slugs and snails can be controlled with metaldehyde baits. A piece of dry cottonwool tied round the flower stems of cymbidiums will prevent slugs from reaching the flowers. D.D.T. wettable powder can be used for caterpillars.

Purchase of Plants

The New Zealand Orchid Society found it necessary to warn its members recently of the need for care in the purchase of plants, as from time to time plants which have little chance of survival in the hands of an amateur are put on the market. Before buying it is advisable to consult an experienced grower, the New Zealand Orchid Society, with its headquarters in Auckland, or the Christchurch Fern, Begonia, and Orchid Society. If this is not possible, no plant should be bought which:—

1. Is potted in soil or a compost consisting mainly of soil (except bletias).
2. Is potted in pure sphagnum moss.
3. Is potted in a compost that appears to be rotting down or is waterlogged.
4. Appears to have just been potted up, if it is not the correct season for potting.
5. Is loose in the pot: it may have no roots. A reputable dealer will not object to a customer giving the plant a slight tug.

Publications Recommended

For further reading on this subject the following publications are recommended:—

Bulletins of the New Zealand Orchid Society (issued monthly to members).

"Orchids and Their Cultivation" (Sander and Cooper).

"Successful Orchid Culture" (Rittershausen).

"You, too, Can Grow Orchids" (Hancock and Smith).

"Orchids, Their Description and Cultivation" (Curtis).

"ABC of Orchid Growing" (Watkins).

"Orchids for Amateurs" (Briscoe).

"Cultural Table of Orchidaceous Plants" (Murray Cox).

"Orchid Review" (N.S.W. Orchid Society).

With the exception of the bulletins none of the publications is written for New Zealand conditions and allowances must be made for seasonal and climatic differences.

Garden Work for December

Work in the flower garden in December is influenced to a large extent by the coming holidays.

People who are staying at home for the Christmas and New Year holidays will aim to have their gardens looking as attractive as possible and bedding out should have been planned accordingly. The major activities will probably consist of tidying up. Hoeing should be done frequently to suppress any weed seedlings that may germinate; this operation will also assist in conserving soil moisture. Lawn edges should be kept trimmed so that the grass will remain fresh right to the edge.

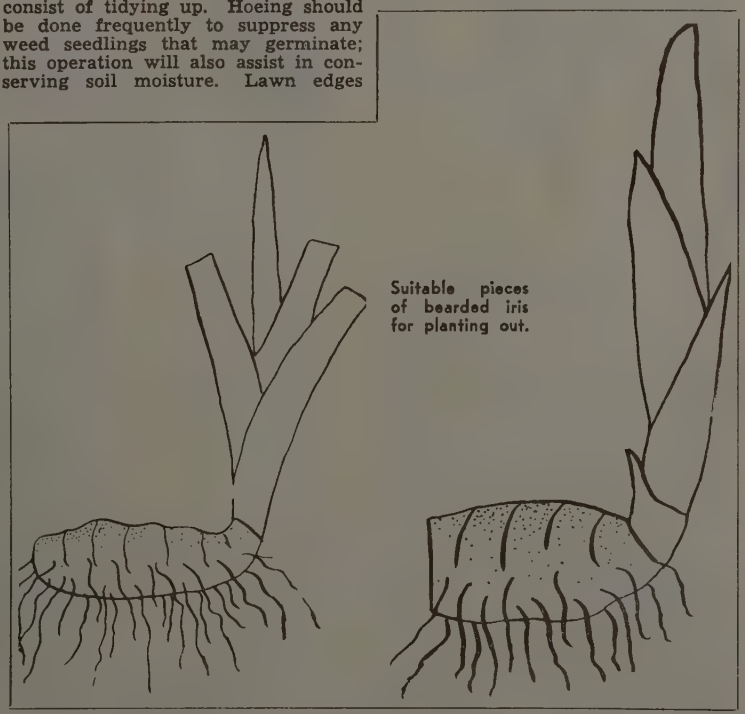
Home gardeners who are going away should prepare the garden in the same manner, but in addition to weeding before departure mulching of flower beds can be most useful.

Plants requiring support should be well staked and tied up, as nothing is more discouraging than to return to a garden that has been spoilt by winds. Lawns should be cut as late as possible and where necessary hedges should also be trimmed.

Mulching

A mulch of organic material is very useful during the hot period of the year and can be applied to flower beds and borders as well as round trees and shrubs. Not only will it keep down weed growth and assist in conserving moisture, but it will provide humus-forming material to the soil. Any organic waste is useful, the most commonly used being strawy manure, half-rotted compost, old leaves, stack bottom, and grass cuttings. The last are very satisfactory, but should be applied only in a thin layer at any one time, as fermentation will otherwise set in; once they are withered they are safe.

Before the mulch is applied the soil should be loosened by hoeing or fork-



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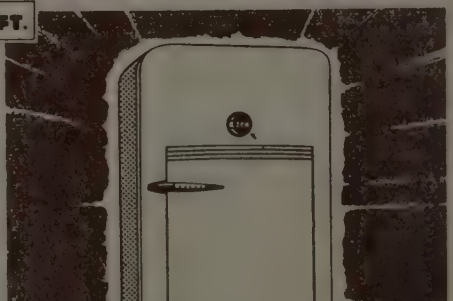

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ing, and if it is dry, a good watering should be applied.

A heavy mulch should not be placed close to the stems, branches, or trunks of plants, as that may weaken the tissues and allow entry of undesirable fungi and bacteria.

Bedding Plants

Summer flowering subjects are now coming into flower. Many bedding plants are annuals and their natural habit is to flower, set seed, and die. To lengthen the life of these plants in the garden the old flowers should be removed as soon as they are spent. The plants will then continue to flower to enable them to carry out their normal function: to produce seed for the next generation.

Another point to consider with annuals is an adequate supply of moisture at the roots. If these plants receive a check in growth, they will set flowers, often prematurely, and attempt to set seed.

If annuals are well cared for and their spent flowers are removed, they will flower for a much longer period. Seeds of many bedding plants for late winter and spring display can now be sown; among them are pansy, viola, Iceland poppy, wall flower, sweet william, winter flowering marigold, forget-me-not, and Canterbury bells.

Bulbs

The foliage of spring flowering bulbs will now have dried off and the bulbs can be lifted if desired.

Narcissi should be lifted every 3 years, but tulips and hyacinths should be lifted every year. Though it is desirable to dry bulbs well after lifting, they should not be left exposed to the hot sun. An airy position in the shade is the best.

Narcissi bulbs should be covered with scrim to avoid bulb flies laying eggs on the exposed bulbs.

Bearded Iris

Where bearded iris plants have been growing in the same position for some years the rhizomes will have grown together, forming a mat. They should be lifted and divided every 2 or 3 years. December and January are the best months for that, as the plants will then be able to establish themselves before winter and flowers will be produced the next season. If the job is left to be done during winter, very few flowers will develop the following year.

The old parts of the plant should be discarded and short pieces of rhizome, with one or two shoots, as shown in the illustration, should be planted. Mature leaves should be trimmed back about half their length and the rhizomes when planted in the new position should be barely covered with soil.

A sunny position is essential and drainage must be perfect. In heavy soils it is advisable to incorporate sand when preparing the ground for planting. Animal manure or rotting compost should never come in contact with the rhizomes. If manuring is necessary, a dusting of bone dust worked well into the soil before planting is the safest method. On acid soils applications of lime should be made also.

The distances between plants will vary according to type; for the dwarf varieties 6in. will be enough, but for the large-growing varieties 15in. will not be too much.

Carnations

In the home garden layering is the best method of propagating carnations. If it is done during December, strong plants will develop before autumn. Plants which have been growing strongly and have produced good flowers should be chosen and treated as shown in the illustration.

The layers should be left undisturbed until good root systems have developed, generally in March, when they can be cut off from the parent plants and transplanted to their permanent quarters.

Delphiniums

It is common practice in home gardens to raise delphiniums from seed. Often seeds are imported and even under the best cultural conditions germination may be very poor. The reason is that the seeds have not been fresh, a factor to consider at this time of the year when the seed is forming. If seeds are saved by the home gardener, they should be sown as soon as possible after harvesting. A good strike will generally result and if planted during this month or next, the seedlings will develop enough to survive conditions in home gardens during the coming winter.

Climbing Roses

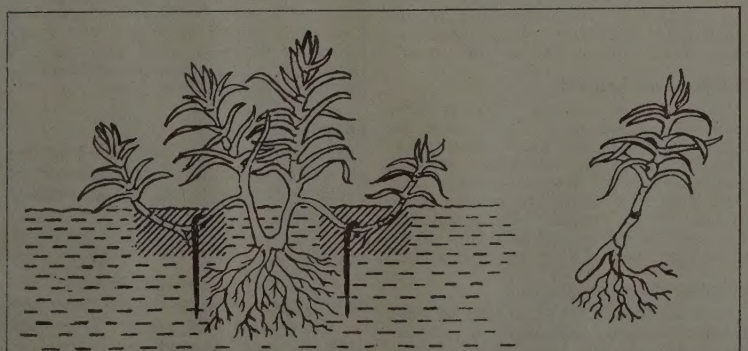
On many climbing roses strong new canes are now developing. These are often situated low on the plant and can be rather a nuisance. They come in the way of the lawnmower and catch in clothes when passed by. The result is that they are cut off. This should never be allowed. These shoots are of value in replacing the older branches and during the following season the best roses are generally produced from them. They should therefore be tied in carefully, but in a rather upright position, when the best development will take place. During winter pruning they should be tied down in positions as replacements of the older branches that are being cut out.

Red Mites

Red mites are minute sucking insects that cause damage during the hot period of the year. They are generally found on the undersides of leaves as grey or red specks; the leaves they feed on will have a dry greyish-brown appearance. They attack a great range of plants not only in the flower garden but also in the vegetable garden and the orchard.

Because red mites prefer dry conditions, it is often possible to guard against these insects in the home garden by washing suspected host plants down with the hose when watering the garden.

If, however, an infestation occurs, control sprays must be applied. Summer oil (1 per cent.) plus nicotine sulphate (1 in 800) applied at 10-day intervals generally give good results after two or three applications. Spraying must be very thorough, with a complete cover on the undersides of all the leaves.



Layering of carnations is done by replacing the surface soil with compost, removing the lower leaves of selected shoots, cutting a slanting notch about ½in. into the lower side of the stem, and pegging down with stout wire. On the right is a layer separated from the parent plant after it has rooted.

Child's Attractive Cardigan

THE attractive cardigans illustrated at right are identical and have been knitted from the pattern given below. The pattern is given in three sizes to provide a range to fit most children of primary school age or to enable children of different ages to be dressed identically.

ABBREVIATIONS: K., knit; p., purl; st., stitch(es); tog., together; rep., repeat; st.st., stocking stitch; w.b., wool back; w.r.n., wool round needle; cont., continue; patt., pattern; inc., increase; dec., decrease; in., inch(es); beg., beginning; sl., slip; p.s.s.o., pass slipped stitch over; fin., finishing.

Materials: 3oz. of 3-ply wool for size 1; 4oz. of 3-ply wool for sizes 2 and 3; 2 No. 6 and 2 No. 11 knitting needles; 6 buttons.

Measurements: Size 1: Chest 25in., length 13½in., sleeve 11in. Size 2: Chest 27in., length 15in., sleeve 12½in. Size 3: Chest 29in., length 16in., sleeve 13½in.

Tension: 6 st. to 1in.

The first figures given are for size 1. The first figures given in brackets are for size 2, and the second figures in brackets are for size 3.

The Back

Using No. 11 needles, cast on 60 (66, 72) st. and work in k. 1, p. 1 rib for 3in. (3in., 3½in.). Change to the following patt.: 1st row: Change to No. 6 needles, k. to end. 2nd row: P. to end. 3rd row: Change to No. 11 needles, k. to end. 4th row: P. to end.

These 4 rows form the patt. Cont. in patt. for 2 more rows, then inc. 1 st. each end of next row and every following 6th row until there are 72 (78, 84) st. Cont. straight, remembering to change needles every 3rd row until work measures 8½in. (9½in., 10in.).

Shaping the Armholes

Cast off 3 st. at beg. of next 2 rows, then dec. 1 st. both ends of every row until 58 (62, 66) st. remain. Cont. without dec. until work measures 13½in. (15in., 16in.) from beg.

Shaping the Shoulders

Cast off 10 (10, 11) st. at beg. of next 4 rows. Cast off remaining 18 (22, 22) st.

The Pocket Linings (2)

Using No. 11 needles cast on 18 (20, 22) st. and work in k. 1, p. 1 rib for 3in. (3in., 3½in.). Leave on st. holder for the present.

The Right Front

Using No. 11 needles cast on 39 (42, 45) st., and work in k. 1, p. 1 rib for ½in.

Next row: Rib 3, cast off 2 st., rib to end. In next row cast on 2 st. in place of those cast off. Cont. in rib but making 2 more buttonholes at 1in. (1in., 1½in.) intervals, then work in rib until welt measures 3in. (3in., 3½in.), fin. at front edge.

Work as follows: 1st row: Rib 8, change to No. 6 needles, p. 2, k. 3, p. 2, k. 2, cast off 18 (20, 22) st. in the rib, k. to end. 2nd row: P. 4 (5, 6) st. With wrong side of one pocket lining facing, p. over 18 (20, 22) st. of pocket, p. 2, k. 2, p. 3, k. 2, change to No. 11 needle, rib to end. 3rd row: Rib 8, p. 2 w.b., sl. 1, k. 2, p.s.s.o. the 2 sts., p. 2, k. to end. 4th row: P. 24 (27, 30) st., k. 2, p. 1, w.r.n., p. 1, k. 2, rib 8. 5th row: Rib 8, change to No. 6 needle, p. 2, k. 3, p. 2, k. to end. 6th row: P. 24 (27, 30) st., k. 2, p. 3, k. 2.

Change to No. 11 needle, rib 8. Rep. these last 4 rows, inc. 1 st. at side edge on next row and every following 6th row until there are 6 incs. made at this edge, **but at the same time**, when work measures 4½in. (4½in., 4¾in.), fin. at front edge, make another buttonhole as before and 2 more at 1½in. (2in., 2½in.) intervals. When last buttonhole is completed, fin. at front edge, work thus: Next row: Rib 8, patt. 7, k. 2 tog., k. to end. Now dec. 1 st. on every 3rd (3rd, 4th) row following inside mock cable patt. until work measures 8½in. (9½in., 10in.), fin. at side edge.

Shaping the Armhole

Cast off 3 st. at beg. of next row, then dec. 1 st. at armhole edge on every row 4 (5, 6) times, then cont. without dec. at armhole edge, but still remembering to dec. on every 3rd (3rd, 4th) row at inside border until 28 (28, 30) st. remain. Cont. without dec. until work measures 13½in. (15in., 16in) from beg., fin. at armhole edge.

Shaping the Shoulder

Cast off 10 (10, 11) st. at beg. of next 2 alternate rows, then cont. on remaining 8 rib st. for 1½in. (1½in., 1½in.). Cast off.

The Left Front

Using No. 11 needles cast on 39 (42, 45) st. and work in k. 1, p. 1 rib for 3in. (3in., 3½in.). Next row: Change to No. 6 needle, k. 4 (5, 6) st., cast off 18 (20, 22) st. in the rib (1 st. left on needle from casting off) k. 1, p. 2, k. 3, p. 2, change to No. 11 needle, rib 8. 2nd row: Rib. 8, change to No. 6 needle, k. 2, p. 3, k. 2, p. 2, then with wrong side of pocket lining facing, p. over 18 (20, 22) pocket st., p. to end. Now cont. to match right front, reversing all shapings and omitting buttonholes.

The Sleeves

Using No. 11 needles cast on 36 (38, 42) st. and work in k. 1, p. 1 rib for 2in. Change to patt., working 2 rows on No. 6 needles and 2 rows on No. 11 needles in st.st. for 4 rows, then inc. 1 st. each end of next row and every following 6th row until there are 54 (60, 66) st. Cont. straight until sleeve measures 11in. (12½in., 13½in.).

Shaping the Top

Dec. 1 st. each end of next 4 alternate rows, then dec. 1 st. each end of every row until 14 (18, 22) st. remain. Cast off.

Making up

Press work with a hot iron and damp cloth. Sew in sleeves, then sew up sleeve and side seams. Sew back neck st. together and sew border to neck. Place pockets in position and sew down neatly. Sew on buttons to correspond with buttonholes. Press all seams.

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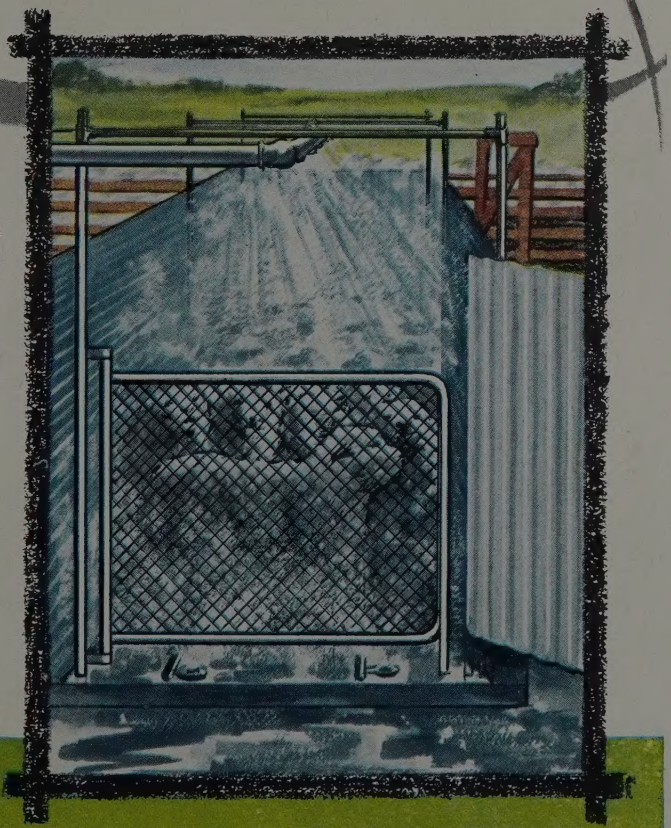

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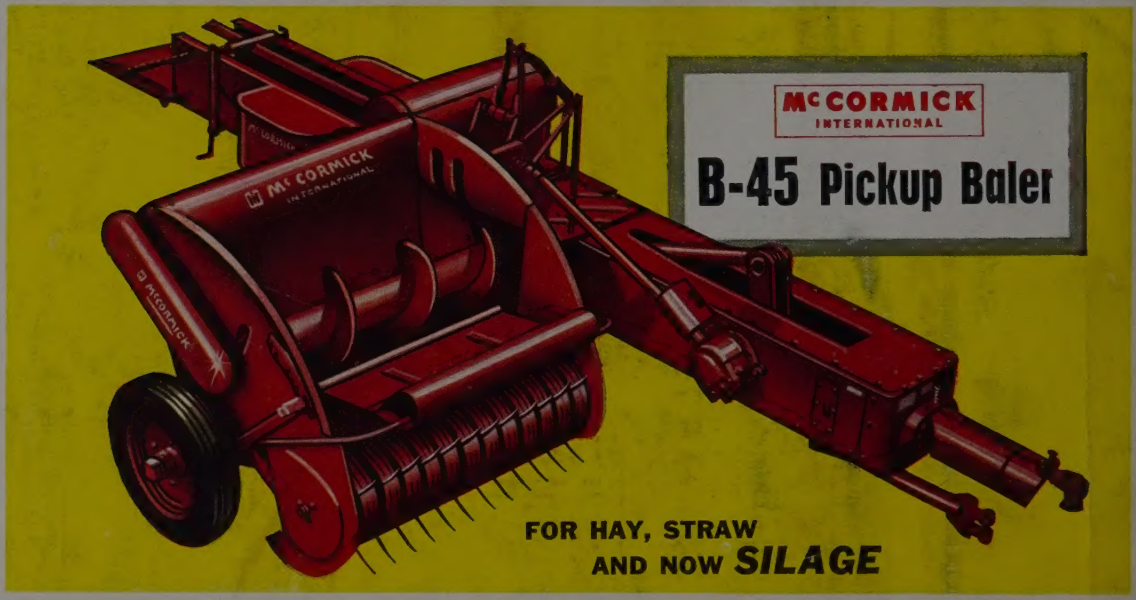

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